New Diesel Shops for CNR

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RF&P Speeds Car Inspection

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RAILWAY

LOCOMOTIVES AND CARS

A SIMMONS-BOARDMAN TIME-SAVER PUBLICATION

APRIL 1960

FOUNDED 1832
AMERICA'S OLDEST TRADE PAPER

Building Southern 100-Ton Aluminum Gondolas . . . page 27

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Rewound motors can be upgraded with NECCOBOND field coils by National ... *The Specialists in electric coils/repair service*

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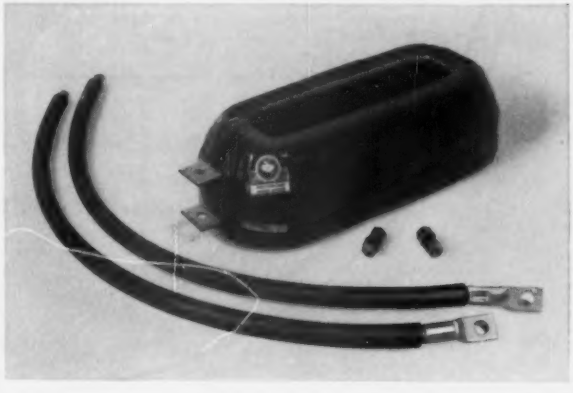
NECCOBOND field coils upgrade performance. Coils operate cooler—insulation lasts longer and is impervious to water, oil, or other sources of trouble.

For more information call our Columbus plant—HUdson 8-1151, or the nearest National field engineer.



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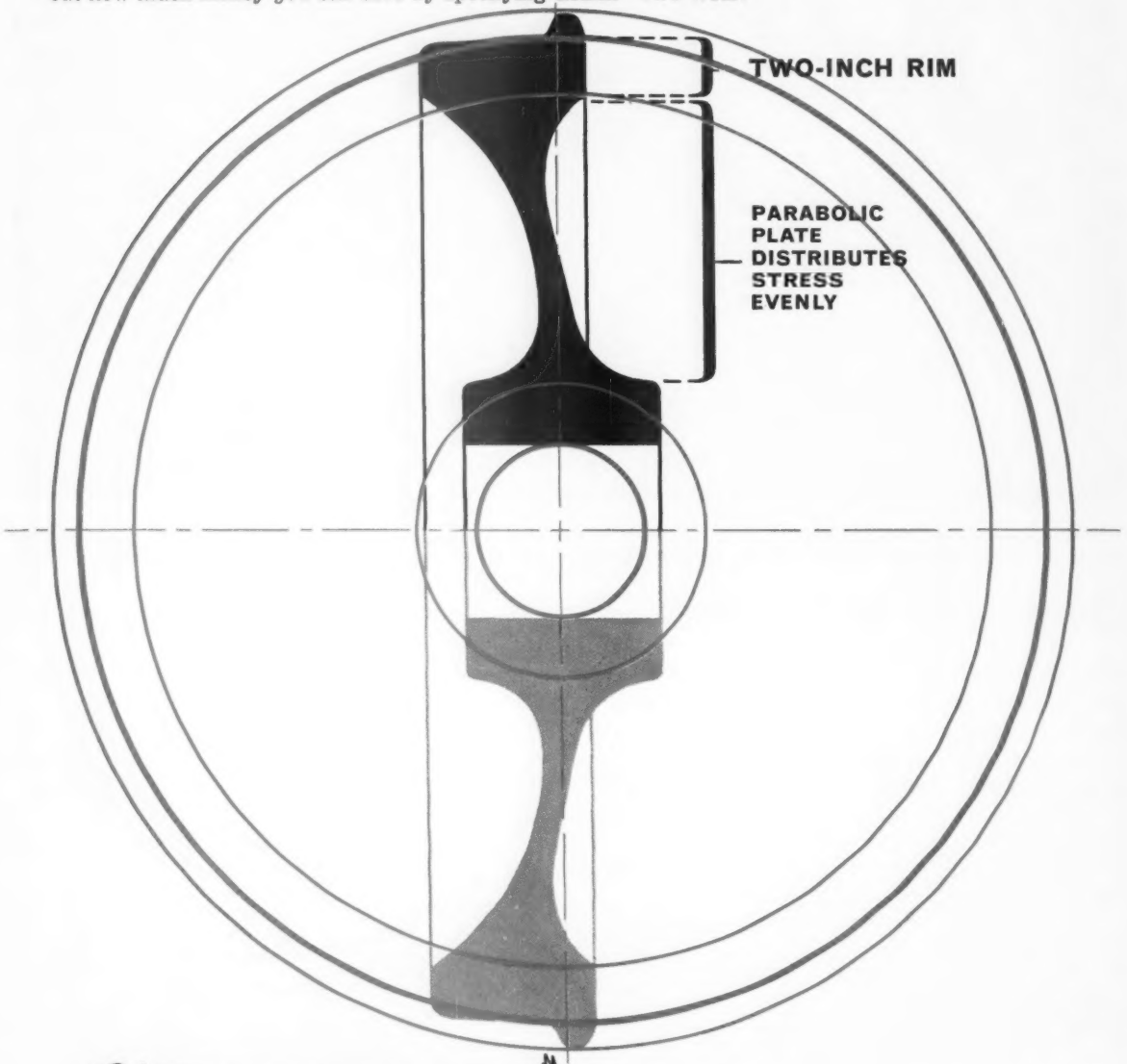
GRIFFIN "TWO WEAR" WHEEL NOW APPROVED BY AAR

Developed to meet the grueling demands of high mileage freight cars, Griffin's "Two Wear" Wheel has been approved for application to 50- and 70-ton cars by the AAR.

Bonus feature Number One: the "Two Wear" Wheel is a *multiple-wear* wheel that can be "turned" several times. (You're assured of *at least* two full turns, regardless of flange wear.) The wheel has a two-inch rim, with one-wear tread and flange design, and is cast to within 20-thousandths of an inch dimensional tolerances.

Bonus feature Number Two is the parabolic shape of its plate—scientifically designed to minimize concentration of stress by *distributing* stress evenly. Call your Griffin Representative today and find out how much money *you* can save by specifying Griffin "Two Wear."



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RAILWAY
LOCOMOTIVES AND CARS

America's Oldest Trade Paper

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REPORT FOR APRIL

Speakers Named for AAR Frisco Meeting

D. J. Russell, president, Southern Pacific, will address the opening joint session of the AAR Mechanical Division and Electrical Section of the Engineering and Mechanical Divisions on June 14. The annual meetings of the two groups are to be held June 13-16, inclusive, at the Jack Tar Hotel, San Francisco. D. W. Brosnan, vice-president (operations), Southern, will speak at the Mechanical Division meeting on June 15, and Commissioner Everett Hutchinson of the Interstate Commerce Commission will address the June 16 session.

By late March, contracts had been completed for almost all of the Jack Tar exhibition space for the 43rd annual exhibit of the Railway Electrical and Mechanical Supply Association, which is to be held in conjunction with the AAR meetings. Plans are now being completed with the Southern Pacific for a track exhibit area.

The design of this 70-ton hopper car, developed jointly by the C&O, N&W, and PRR, has been adopted as an alternate standard by the AAR, Mechanical Division.

Revised Solid Bearing Becomes Standard

Manufacturers having facilities available are to arrange to produce immediately a revised standard solid journal-bearing design (RL&C, Feb. 1960, p 5) which has now been approved by Special Letter Ballot of AAR Mechanical Division members. The deadline for the production of the new bearing is July 1, 1960. The bearing as altered has been increased in length ¼ in., with additional increases in length of 3/32 in. for each of the step-size bearings A-3 and A-5 to compensate "for increased lengths of journal on which such bearings are used." The lug of the bearing has been moved back 3/16 in.; edges of bearing back have been depressed 1/16 in., producing a raised load pad in the center; bearing and lining radii at collar end have been increased from ¾ in. to 13/16 in., and bearing and lining radii at lug end have been increased from ⅛ to ¼ in.

In the same Letter Ballot approval is also given on the revision of Roller-Bearing Grease Specification M-917-56 to include procedure for determining rust preventive properties, effective immediately.

The Letter Ballot also approves the adoption of a 70-ton hopper car design as an alternate standard and permits immediate contruction. This car, designed jointly

(*Continued on page 9*)

TIME SAVING IDEAS FOR APRIL

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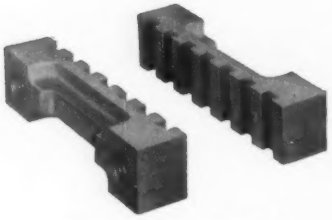
RAILROAD BEARINGS are MAGNUS' BUSINESS

Today, and tomorrow too,
you can bank on Magnus to give you
the bearing performance you want
at a price you can afford to pay!

Magnus Solid Journal Bearings



Magnus R-S Journal Stops

Magnus Traction-Motor Support Bearings

YES, Magnus is in the railroad bearing business—has been almost from the days of the Tom Thumb! And during this century of specialized service, Magnus has pioneered many significant advances in bearing metallurgy and design—to provide better bearing performance at lowest possible cost.

For example, the recently-introduced Magnus R-S Journal Stops have given railroads the first truly low-cost solution to the hot-box problem. By taking the "slop" out of the journal box, R-S Journal Stops prevent excessive displacement or lifting of the bearing—even under the most severe braking and switching impacts. They increase bearing life 200 per cent, reduce wheel flange wear, protect dust guards—cut operating costs all along the line. Magnus lubricators provide another important link in the chain of improved bearing performance. And in diesel-electric and electric locomotives and MU cars, modern Magnus traction motor support and armature bearings assure trouble-free mileage between motor overhauls.

And Magnus is keeping a weather eye on the *future*, too. With this background of railroad experience, Magnus is continually developing and testing new designs of journal box components for still greater efficiency and economy in railroad service. Whatever the future may hold, of this you can be sure. Tomorrow's rolling stock will ride on Magnus bearings—bearings that are *right for railroads* in performance and in cost. For further information on Magnus bearing products, write to Magnus Metal Corporation, 111 Broadway, New York 6, or 80 E. Jackson Blvd., Chicago 4.

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A-1549A

by the Chesapeake & Ohio, Norfolk & Western, and Pennsylvania, has outside side stakes as contrasted with the inside stakes of the AAR standard car. A complete set of drawings will be included in the Supplement to the AAR Manual about May 1.

New Shop Projects

Canadian National, Western Region—A combined freight-car and passenger-coach shop is expected to be completed at Transcona, Man., during 1960, at a cost of $953,356.

Canadian Pacific.—A one-story, steel-frame rail diesel car servicing shop, costing $233,500, is scheduled for completion this spring at Glen Yards, Montreal.

Pennsylvania.—The Pennsylvania is investing $1,000,000 in new "one spot" car repair facilities at its Conway yard near Pittsburgh, Pa. One new car shop (at west end of yard) went into continuous operation in February. Construction will start soon on a second shop at the east end.

Journal Lubricator Applications

Journal lubricators had been applied to 887,020, or 49.9 per cent of the 1,776,174 railroad-owned revenue freight cars as of December 31, 1959. On that date 111,089, or 40.3 per cent of the 275,406 revenue cars under private car ownership had also been equipped with journal lubricators. Both classifications total 998,109 cars, or 48.6 per cent of 2,051,580 cars.

Miscellaneous Publications

ASTM Petroleum Standards. The 1959 edition of the ASTM Standards on Petroleum Products and other Lubricants contains almost 200 standards of which some 45 are new, revised or have their status recently changed. Included are standards on crude petroleum, butadiene, motor and aviation fuels, napthas, diesel fuels, lubricating, industrial, cutting and turbine oils, greases, waxes, spray oils and other related materials. *ASTM Headquarters, 1916 Race st., Philadelphia 3. Price, $9.*

HOT BOX STATISTICS

	Cars set off between terminals with hot boxes		Miles per car set off
	System	Foreign	
1954	53,785	75,058	247,932
1955	51,526	90,525	242,233
1956	56,239	113,047	209,479
1957	65,146	121,890	182,435
1958	60,112	96,358	200,417
Year 1959			
Jan.	3,477	5,980	275,112
Feb.	3,547	6,802	235,057
March	3,364	6,705	275,160
April	3,836	7,383	243,032
May	5,113	10,756	181,319
June	6,262	13,907	138,002
July	6,809	13,845	128,643
Aug.	7,274	13,200	125,506
Sept.	5,493	9,612	164,222
Oct.	3,694	6,976	253,338
Nov.	2,377	4,938	355,577
Dec.	1,941	4,180	435,711

Orders and Inquiries for New Equipment

Placed Since the Closing of the March Issue

Diesel-Electric Locomotive Orders

Road and builder	*No. of Units*	*Horsepower and type*	*Detail*
CANADIAN PACIFIC:			
Canadian Locomotive	5	44-ton diesel hydraulic	
General Motors Diesel	25	1,200 branch line	
Montreal Locomotive	15	1,000 road switch	
DULUTH, MISSABE & IRON RANGE:			
Electro-Motive	13	1,800	For delivery this month.

Freight-Car Orders

Road and builder	*No. of Cars*	*Type of car*	*Detail*
BALTIMORE & OHIO:			
Company shops	78	Flat	47-ft.
	70	Flat	53½-ft.
	60	Piggyback flat	47 ft.
	40	Flat	41 ft. demountable body. Delivered in January.
BOSTON & MAINE:			
International Car.	20	Caboose	
CANADIAN PACIFIC:			
Canadian Car	500	Box	50-ton.
Dominion Steel & Car	300	Flat	53½-ft, 70-ton. 100 to be equipped with end bulkheads.
National Steel Car	500	Box	50-ton.
	100	Piggyback flat	46-ft.
CENTRAL OF GEORGIA:			
Pullman-Standard	100	Covered hoppers	
FRISCO:			
General American	100	Box	Insulated. Acquired under lease.
ILLINOIS CENTRAL:			
American Car & Fdry.	150	Twin hopper	70-ton. Scheduled for February and second quarter 1960 delivery.
General American	20	Covered hopper	70-ton, Dry-Flo; 3,500 cu ft capacity. For late second quarter or early third quarter delivery.
NORFOLK & WESTERN:			
Company shops	1,000	Hopper	Roller-bearing, coal-carrying. Said to be only 85-ton hopper cars on any U.S. railroad. Construction to begin about August 1 at a cost of $12,000,000.
NORTH AMERICAN CAR:			
Pacific Car & Foundry	250	Refrigerator	50-ton, 44-ft RB bunkerless. Equipped with roller bearings. 150 for spring delivery; 100 for autumn delivery.
UNION PACIFIC:			
Company shops	300	Box	Plug-door type.
	300	Flat	70-ton.
	200	Box	Insulated.
Gunderson Bros. Engineering Corp.	200	Gondolas	46-ft, 70-ton, to be equipped with self-clearing unloading doors for handling sugar beets, coal, and similar commodities.
Pullman-Standard	200	Gondolas	
	150	Covered hopper	2,100 cu ft capacity.
UNION TANK CAR:			
Company shops	26	Tank	20,000-gal.
	5	Tank	12,000-gal.
	35	Tank	10,000-gal.
	1	Tank	8,000-gal.
U. S. DEPT OF INTERIOR:			
American Car & Fdry.	100	Helium	

Passenger-Car Orders

Road and builder	*No. of Cars*	*Type of car*	*Detail*
UNION PACIFIC:			
Budd Co.	20	Coaches	44-seat, leg-rest reclining seat type. For late 1960 and early 1961 delivery.
American Car & Fdry.	25	Baggage	For late 1960 and early 1961 delivery.

Notes and Inquiries

New Haven will order 50 air-conditioned commuter cars under New York Governor Rockefeller's commuter-aid plan. Plan calls on Port of New York Authority to arrange part of the financing and lease of up to 100 cars to road.

Union Pacific has ordered 200 gondolas in addition to 200 listed above. Builder not identified.

Western Pacific has set up $4,125,000 tentative budget for acquisition of new equipment during 1960.

LOCOMOTIVES AND CARS **WHAT'S NEW** IN EQUIPMENT

Impact Tool

The Size 8U heavy duty electric Impactool is said to give 20 per cent more power than the previous model. More power is obtained through a heavier impact mechanism, a universal motor of 6 amp (instead of 5 amp as in the old model), and a T-type socket driver which improves power transmission. The improved model is ¼ in. shorter, has an easily replaceable socket retainer, nylon trigger, and reinforced nosed hammer case.

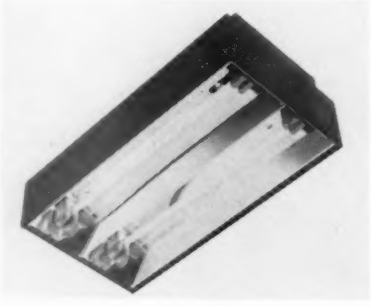
The tool weighs 10 lb. It has a ⅝-in. square drive and runs with a free speed of 1,700 rpm. Both 110- or 220-volt models are available for use on a.c.-d.c. current. A collet type chuck and accessories convert the tool into a drill, reamer, tapper, or wire brush tool. *Ingersoll-Rand, Dept. RLC, 11 Broadway, New York 4.*

Swivel Jaw Nut Splitter

The HKP swivel jaw nut splitter is designed to cut "frozen" or rusty nuts up to, and including, ⅞-in. across flats. To operate, the swivel blade is placed against the side of the nut, the power screw is turned by hand until the jaw is tight against the nut, and then tightened with a hand or power wrench until enough pressure is applied to split the nut. The tool will not damage the bolt from which the nut is removed. *H. K. Porter, Inc., Dept. RLC, 74 Foley st., Somerville 43, Mass.*

Caulking Compound

Farboil Epothane Farbo-Flex, a caulking compound, is said to remain permanently flexible on exterior or interior surfaces and to withstand extreme continuous expansion and contraction when exposed at temperatures from minus 65 deg F to 300 deg F. Adhesion is fusion-like and is not impaired by impact, vibration, contraction, or expansion. In addition, corrosive atmosphere or chemical fumes have little effect on the cured metal. *Farboil Co., Dept. RLC, Baltimore 30, Md.*

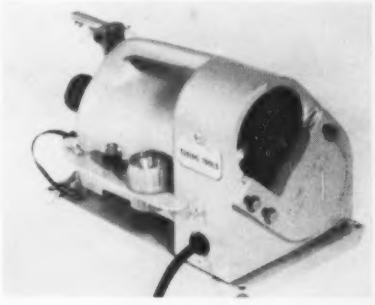


Infrared Heating Unit

Luminator Infrared heating units, designed with reflectors for use with GE T-3 Tubular quartz infrared lamps having filament temperatures in excess of 4,000 deg F, convert approximately 85 per cent of their energy into radiant heat similar to that of the sun. The Luminator units then project this heat in the same way that light is projected. The projected heat can be directed to specific areas. The units are particularly suited for use in maintenance shops, for loading platforms, etc. One-lamp fixtures range from 500 to 5,000 watts; two-lamp fixtures, from 1,000 to 10,000 watts, and three-lamp fixtures from 1,500 to 15,000 watts. Fixtures range in length from 10½ to 55½ in. *Luminator, Inc., Dept. RLC, 120 N. Peoria st., Chicago 7.*

Cement Car Cleaning Method

A new method of cleaning cement bottles and covered hopper cars uses, basically, the Ripco portable air caddy with its vacuum suction unit. It is powered by a 32-hp gas engine; is operated by one man, and can be moved rapidly from car to car. No one need climb into the bottle or hopper; the 4-in. suction hose is inserted and the cement is sucked out quickly and without dust. According to the manufacturer, it is possible to clean 10 barrels of old cement out of a 5-bottle car in 12 min, with the unwanted cement being blown directly to the disposal dump. Hand-labor method required three men and six to nine man-hours. *Ripco Air Systems, Inc., 251 S. Third st., Oxford, Pa.*



Cleaning and Deburring Machine

The Toled-O-Matic No. 1 Buff-Ezy will clean and deburr all size copper tubing up to 4 in., as well as clean threaded fitting, internal threads of valves, etc. It is portable, but is provided with a heavy metal base plate for bench mounting. It weighs 52 lb. A 4-in. main brush, with adjustable "reverse L" guide, handles external cleaning operations. For internal cleaning and deburring, three sizes of brushes and a rotary internal deburring tool work off the other end of the motor shaft under a clear plastic protective guard. The machine has a 1/3-hp single-phase motor which operates on 115-volt, a-c 60-cycle current. *Toledo Pipe Threading Machine Co., Dept. RLC, Toledo, Ohio.*

Modified Self-Locking Nuts

The Equa-Stress thread form, a modification of the standard UNF-3 thread form, has been incorporated in the new Double/Durability line of Elastic Stop nuts. The modification is said to redistribute the concentrated stress loading that is the principal cause of bolt fatigue. The nuts are self-locking; are interchangeable with other standard nuts, and are capable of inspection by standard gages and conventional techniques. *Elastic Stop Nut Corp. of America, Dept. RLC, 2330 Vauxhall Rd., Union, N.J.*

(Turn to page 15)

Spruce up for Spring with...

AEROWASH-A

Now's the time of year to clean winter's accumulation of dirt and grime off your locomotives and cars — with AEROWASH-A, Wyandotte's all-purpose **liquid** cleaner for painted surfaces.

Versatile AEROWASH-A is equal to your toughest spring cleaning jobs. **Outstanding performance**— cleans quickly, effectively.

And AEROWASH-A **reduces labor costs.** Its faster, more effective action lets your men do cleaning jobs in less time. Ideal for either machine cleaning or hand brushing.

Because it's a liquid, AEROWASH-A is **convenient to use.** No waiting for it to dissolve. Just dilute, and you're ready to go. Can be piped directly into automatic operations.

AEROWASH-A is excellent for cleaning interiors, too. There's no fire hazard. And it's pleasant to use, no noxious odors. Safe to handle — nontoxic, mild on skin.

Your Wyandotte cleaning specialist will be glad to give you more details on AEROWASH-A. Just call him today. *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Also Los Nietos, California, and Atlanta, Georgia. Offices in principal cities.*

Wyandotte CHEMICALS

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J. B. FORD DIVISION

SPECIALISTS IN RAILROAD CLEANING PRODUCTS

A Factual Report on COBRA* SHOES

based on a personal interview with Mr. Walter Kresge, General Superintendent, Pittsburgh & West Virginia Railroad Company

What does railroad management think of COBRA SHOES after some four years and 200,000,000 (200 million!) vehicle miles of service? That's the question . . . and while we folks who make COBRA SHOES, and have been continuously testing them under almost every conceivable condition of service, might think we know the answers, we learn something new almost every installation about these truly revolutionary brake shoes. But, to let you hear direct from a man who is in a position to observe the actual in-service performance of COBRA SHOES, we sent R. A. Mitchell, our representative, out to the Rook Yards of the Pittsburgh & West Virginia Railroad Company (near Pittsburgh) to interview Mr. Walter Kresge, General Superintendent. Mr. Kresge is the superintendent of both the Operations and Mechanical departments.

Mr. Mitchell: We understand that your yard locomotives are all equipped with COBRA SHOES.

Supt. Kresge: Yes. But our yard locomotives are *also* our road locomotives, so the fact is, all locomotives in service on the Pittsburgh & West Virginia Railroad are 100% COBRA SHOE equipped. We also have COBRA SHOES on our officials' cars.

Q. How long have you been using COBRA SHOES? And what prompted your Line to try them?

A. Our first unit with the COBRA SHOE went into service June 12, 1958. We decided to try COBRA SHOES after hearing about the good results other railroads were obtaining with this modern composition shoe. And, since we wanted to get away from welding up flat spots, we put your COBRA SHOES on all of our locomotives.

Q. Your COBRA SHOE-equipped power has probably been in service long enough now to draw some conclusions. Would you care to tell us exactly what you think of them?

A. Yes. I have no reservations about your new product. COBRA SHOES are the answer to a lot of problems for a Line like ours. You see, our road power operates over grades which definitely present a problem in braking.

Our COBRA SHOE-equipped locomotives, in constant yard and heavy road service, have averaged 75,000 miles between wheel turnings, which is well in excess of our former experience. *And, to date, we have not had a single case of thermal cracked wheels.*

Furthermore, our Line is a curvy one. Straightaways on the Pittsburgh & West Virginia Railroad are probably not longer than 1½ miles. This provides a good test of flange wear. With COBRA SHOES there is less flange wear—wheels maintain better contour—and wheels last longer.

To sum up, our experience with COBRA SHOES has been highly satisfactory. As far as the Pittsburgh & West Virginia Railroad is concerned, COBRA SHOES have eliminated thermal cracking and flat spots. We are getting four times the shoe life we did with our old type shoes. And wheels retain their standard contour for much longer periods.

Mr. Mitchell: Thank you, Mr. Kresge. You sound most enthusiastic about COBRA SHOES. Is there anything you'd care to add to your foregoing comments?

Mr. Kresge: Only to remind anyone considering COBRA SHOES that they introduce an entirely new concept in braking and, as with anything new, they require an educational approach on the part of the Road Foreman and Engineman. *Be sure these important men understand just what these new shoes can do.* To get maximum advantage, I also recommend that when applying these shoes to Road Power, that all units of a locomotive should be equipped at the same time.

*Registered U.S. Trademark

That's it . . . and we think you'll agree that Mr. Kresge's comments have been helpful. But, almost every installation or application of COBRA SHOES is different. *Know what you want to do before you do it.* The situation prevailing on one railroad may not exist on another. But, we have accumulated a wealth of information which may exactly match conditions on your Line. At any rate, regardless of the type of equipment you operate or the conditions under which you operate, you can almost assuredly use COBRA SHOES to reduce or eliminate thermal cracking, worn flanges and flat spots. We will be glad to answer your inquiries . . . in person, if you prefer.

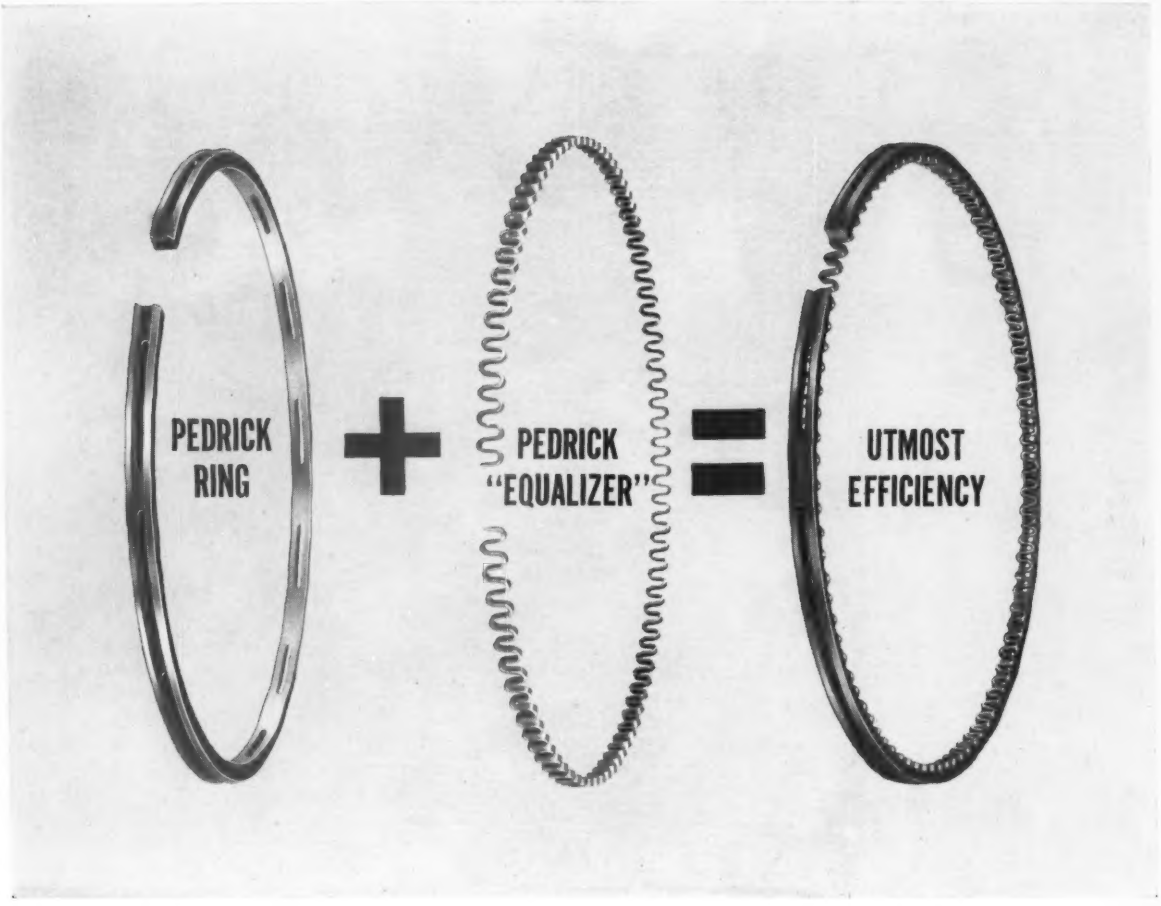
COBRA SHOE installations are growing in number and volume. 97 railroads have such installations—16 more have shoes on order. Total units involved are 5313, consisting of 3585 freight cars, 698 passenger cars, 561 subway cars and 469 locomotives. Cumulative data on all types of service, totaling 200,000,000 vehicle miles, parallel Mr. Kresge's experience of four times the shoe wear and greatly extended wheel life.

The COBRA SHOE . . . a product of the combined research facilities of

WESTINGHOUSE AIR BRAKE COMPANY
Specialists in Braking

JOHNS-MANVILLE CORPORATION
Specialists in Friction Material

RAILROAD FRICTION PRODUCTS CORPORATION *Wilmerding, Pennsylvania*



WHY IS THIS SO? For these reasons:

1. **Pedrick Formflex rings are radially thinner and thus more flexible than other rings. A reduction in radial thickness of as little as 20% *doubles* the ability to flex and *conform*.**
2. **The exclusive "Equalizer", which is a feature of Pedrick Formflex rings, delivers a tension which is absolutely uniform, correct and long lasting.**

Utmost efficiency in oil control, power delivery and fuel consumption is the result when you use Pedrick Formflex rings in complete cylinder sets, available for most popular engines. Engineering service available also for special problems. Phone or write WILKENING MANUFACTURING CO., Philadelphia 42, Pa. Saratoga 9-3770. In Canada: Wilkening Manufacturing Co. (Canada) Ltd., Toronto 2

Pedrick
PISTON RINGS

PEDRICK PIONEERED CONFORMABLE RINGS FOR BIG-BORE ENGINES

WHAT'S NEW IN EQUIPMENT—*(Continued from page 10)*

Carbon-Arc Burner

Exide carbon-arc burner is for use in making emergency, on-the-job repairs to industrial storage batteries and for general heating jobs. Taking 6-volt power from three or more cells of the battery under repair, or from an ordinary automotive battery, flameless burner melts lead of intercell connector to terminal post. Lead antimony alloy from burning strip in worker's left hand fills eye of joint. Openings in vent plugs are covered with water-saturated cloths to prevent igniting gas in cells. *Exide Industrial Div., Electric Storage Battery Co., Dept. RLC, Philadelphia 20.*

Adjustable Roller-Burnishing Tools

Adjustable roller-burnishing tools will finish bored holes in any machineable metal to 4-15 micro inch surface smoothness, eliminating honing and grinding operations. The roller burnisher is easily mounted on a drill press, lathe, or screw machine. The tools are self-feeding and are recommended for all metals not over 35 Rockwell C hardness. They are available in every 1/64 in. increment in sizes from .375 in. to .484 in. and in every 1/32 in. increment in sizes from .500 in. to 7.437 in. Adjustment range is minus .003 in. to plus .017 in. of specified tool size up to .484 in. On larger tools (.500 to 7.437 in.) adjustment range is minus .004 in. to plus .037 in. of specified tool size. Tools are available for through hole and blind end burnishing and for various bore depths. *Gustav Wiedeke Co., Dept. RLC, Dayton 1, Ohio.*

Speedy-Dry Coatings

Speedy-Dry coatings are specially formulated to air dry to touch in less than 30 min. They may be applied to metal or wood surfaces by spray, brush, or dipping methods. Colors include a semi-gloss primer and gloss finishes in chrome, green, black, red, navy gray, silver gray, caterpillar yellow and safety yellow. *Rust-Oleum Corp., Dept. RLC, 2799 Oakton st., Evanston, Ill.*

Materials Handling and Storage Crane

The new Krane Kar features 360 deg boom rotation on ball-bearing turntable; full working reach of entire boom length because boom is pivoted well forward on chassis; dual traction tires; and greater visibility in all directions. Working capacity may be stopped up to 24,000 lb with use of hydraulic outriggers. There are two sizes—Model Fax with 12,000 lb capacity at 6 ft 6 in. radius, and Model Fay with 20,000 lb capacity at 6 ft 6 in. radius. *Silent Hoist & Crane Co., Dept. RLC, 841-877 63rd st., Brooklyn 20, N. Y.*

Pump Oilers

Handi-Grip pump oilers are steel of hammer-gray enamel finish and can be had either with rigid-angle or steel flexible spouts. Bodies are leakproof. A full stream of oil or one drop is delivered according to the pressure applied to the finger lever. The oilers come in ¾-, 1-, 1½-, and 2-pt capacities. Rigid spouts are 6 in. long; steel flexible spouts, 7⅝ in. *Eagle Manufacturing Co., Dept. RLC, 2992 Charles st., Wellsburg, W. Va.*

High Potential Test Sets

A series of bench type, semi-portable Hypot high potential test sets, with outputs to 30 kv, for determining diaelectric strength in electrical power, electronic and communication circuits, components, etc., are available either with a.c. or d.c. output. All models provide continuously variable voltage control. Output voltage and insulation leakage current are indicated on separate meters. Optional features are automatic rate of rise control, preset automatic cycling and automatic cut-off at predetermined leakage current limits. *Associated Research, Inc., Dept. RLC, 3777 W. Belmont ave., Chicago 18.*

Welding Wires and Rods

Automatic welding wires for use with the submerged arc welding processes are made from selected heats of steel, with analysis carefully controlled to fuse with the parent metal under automatic welding conditions. They give comparable physical and chemical characteristics across the base metal, the affected zone, and the weld metal.

Welding wires offered are low-carbon, general mild steel, high-tensile steel, highest tensile steel, mild steel killed, general high tensile and medium carbon steel. Wires are available in coils in weights of 25/30, 55/65, 75/100, 120 or 180 lb, or in fibreboard drums of 250, 500 or 750 lb for uninterrupted production welding.

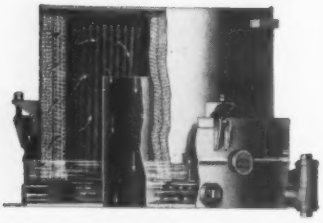
A nickel-silver gas welding rod, Airco No. 21, is capable of joining fourteen different metals. It can be used to replace many conventional bronze, steel and cast-iron welding rods in production and maintenance torch applications where the base metal may be heated to 1,750 deg. F. It can be applied in all positions without fuming or overheating the base metals. Rods are available in 36-in. lengths in 1/16, 3/32, ⅛, 3/16 and ¼ in. diameters. *Air Reduction Sales Co., a division of Air Reduction Co., Dept. RLC, 150 East 42nd st., New York 17.*

(Turn to page 56)

A FILTER TYPE FOR EVERY LOCOMOTIVE NEED

Every diesel relies on various liquids and air for its operation. An established supplier to the railroad field, Air-Maze Corporation has an engineered filter to clean the respective liquids and air, thoroughly and efficiently.

For details, write for bulletins or contact your locomotive builder.



Oil Bath Filter—Removes up to 97% of objectionable dirt...has exceptionally high dirt-holding capacity...requires only semi-annual oil changes and annual removal for cleaning.

Engine Air Intake Filters

Panelbath Filter—Removes up to 90% of objectionable dirt. Designed to up-grade panel filtration of intake air, the PANELBATH has low initial cost...replaces 2" and 4" oil-wetted or centrifugal type panels on engine air intakes.

Lube Oil Strainer

For road use and engine break-in. Furnished in a variety of elements, sizes and degrees of filtration for every type of locomotive application.

Oil Bath Filter for Air Compressor Intakes

Designed specifically for use on locomotive air compressors. Air-Maze oil bath filters, because of their simplicity, offer long, efficient service, infrequent maintenance.

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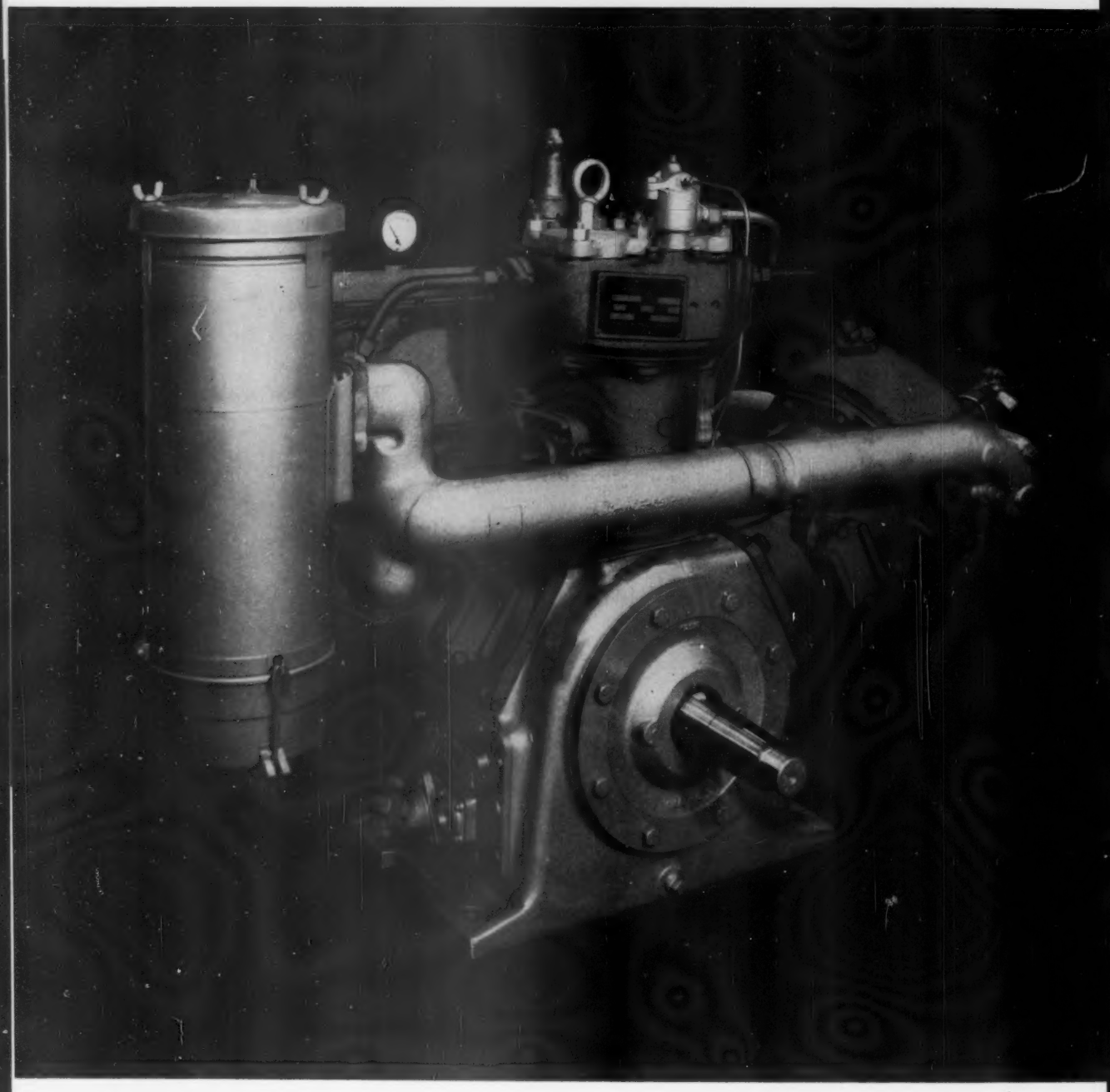
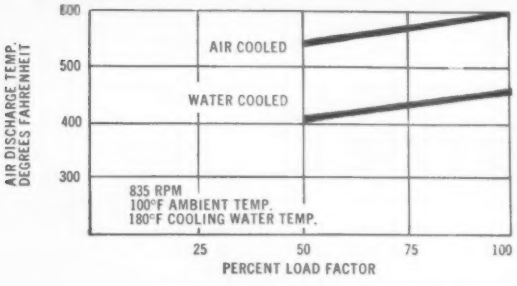


REDUCES AIR DISCHARGE TEMPERATURE 145-150 DEGREES



This graph illustrates how the water-cooled air compressor operates cooler even when the load factor is increased steadily.

ELECTRO-MOTIVE AIR COMPRESSOR CONVERSION KITS

LOCOMOTIVE MODEL	From Air Cooled Compressor	To Water Cooled Compressor	Conversion Kit Part No.	Cooling System Piping Drawing
GP	WXE WXO	WBO* WBO	8237123 8237123	8242802 8242802
F "A" UNIT	WXE WXO	WBO* WBO	8237123 8237123	L-8470 L-8470
F "B" UNIT	WXE WXO	WBO* WBO	8237123 8237123	L-8472 L-8472
E	ADX ADJ	ABO ABO	8243460 8243460	8236521 8236521

*REQUIRES TWO HIGH CAPACITY LOW PRESSURE PISTONS IN ADDITION TO KIT

REFERENCE: CATALOG 90 PARTS GROUP 1100

Present model air compressors can be converted to efficient, low maintenance water cooling. For further information, contact your Electro-Motive representative.

Electro-Motive Air Compressor Kit . . .

Converts air-cooled compressors to water cooling for extended life, lower maintenance

Continuous operation at a 100% load factor

Present day operations place heavier demands on air compressor performance. To match these conditions, Electro-Motive has developed air-to-water conversion kits to assure top compressor performance under the most severe and continuous operating conditions. Temperature remains constant, even at a 100% load factor. Water cooling substantially improves efficiency, while reducing maintenance requirements.

Eliminates damaging oil breakdown

High-temperature operation of air-cooled compressors causes vaporization of lubricating oils which can penetrate brake systems and damage hose and valve parts. The constant temperature feature of a water-cooled compressor eliminates oil vaporization. Water cooling also provides better lubrication of compressor parts by maintaining constant viscosity, thus checking varnishing and reducing oil waste.

Simple, economical installation

Air-to-water conversion is accomplished very simply and inexpensively. Electro-Motive kits contain all necessary component parts for conversion—new cylinders, cylinder heads, intercooler and manifold assemblies. With a small amount of additional piping, the compressor obtains its coolant from the engine cooling system.

Immediate delivery

Electro-Motive's nine on-line warehouses offer convenient, prompt delivery of water-cooled conversion kits:

Los Angeles, California
Emeryville, California
North Salt Lake, Utah
Fort Worth, Texas
St. Paul, Minnesota
Halethorpe, Maryland
Jacksonville, Florida
Hazelwood, Missouri

La Grange, Illinois (factory and parts center)

GENERAL MOTORS LOCOMOTIVES

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS · LA GRANGE, ILLINOIS
Home of the Diesel Locomotive
In Canada: General Motors Diesel Limited, London, Ontario

EDITORIALS

AAR Meeting Attendance

Why does attendance at the AAR Mechanical Division annual meetings compare so unfavorably in numbers with that at the annual meetings of the American Railway Engineering Association? This question was recently asked a member of this publication's staff and, frankly, we were not aware that this situation existed. But a check of the records confirmed the accuracy of the basic facts. For ten years, 1950 to 1959, the total registration at the AREA annual meetings has averaged over 1,900 men. Available data for the same period show the Mechanical Division meetings, excluding 1953 when the meeting was at Atlantic City, had an average attendance under 1,300 men.

The "why" of the question is not easy to answer. On the basis of money spent by the two departments the mechanical department is no less important than the engineering and maintenance of way department. As a matter of fact, according to the AAR bureau of Railway Economics, the Class I railroads spent over 1,797 millions of dollars on maintenance of equipment in 1959 or about 45 per cent more than the 1,236 millions spent on maintenance of way structures.

In discussing this question with mechanical department officers one reason offered for the smaller attendance was the fewer supervisory personnel in the mechanical department. But available statistics do not show this to be so. For December, 1959, the report of the ICC Bureau of Transport Economics and Statistics covering Class I railroads shows a total of 115,733 employees in the maintenance of way and structures department, including signalmen, and 190,572 in maintenance of equipment and stores. In the supervisory positions that might reasonably be expected to attend either Mechanical Division or AREA meetings the mechanical department had almost 8,000 men, the maintenance of way and structures had about 7,000 men. These totals do not include department executives or division officers.

The location of the meetings undoubtedly has an influence on attendance. All AREA meetings during the past 10 years were held in Chicago, except 1957 when the meeting was held in St. Louis. Yet the four Mechanical Division meetings held in the same city, 1956 to 1959, failed by several hundreds to equal the AREA average attendance.

From these statistics it would appear that neither expenditures, available personnel, nor meeting location are reasons for the relatively small attendance at Mechanical Division meetings. A reasonable conclusion is that either mechanical department officers are reticent in requesting permission for staff men and supervisors to attend these meetings or they do not want to give their personnel the same opportunities that are offered to engineering and maintenance of way men. We believe the first reason is the correct one.

The location of the 1960 meeting is not ideal for setting an attendance record. But the railroads will benefit by each railroad giving its full support to the June 14-16 meeting at San Francisco. The committee reports and discussions, the exchange of ideas, and the exhibits of the Railway Electrical and Mechanical Supply Association will be important factors in the never ending search for the means to improve railroad transportation and reduce costs.

Motor Life and Insulation

The "million-mile" motor has been set up as a target for maintainers to shoot at. Everyone would like to get that much mileage out of a traction motor between overhauls. And, everyone would like to feel confident that when he puts a new or an overhauled motor into service that he could forget about it until it had completed its million miles.

But it isn't as simple as that. Accidents happen, and in no two places are service requirements exactly the same. Switchers do not take the beating that is given to a road locomotive. High speeds will cause higher vibration damage than low speeds. Insulation for this kind of service must have high mechanical strength. Long slow-speed pulls that cause high-temperature operation require different insulation characteristics.

The operating departments of some railroads turn deaf ears to their locomotive maintainers who ask for the privilege of seeing their motors more often. The argument with which they oppose the maintainers is "This is a tonnage road, and it is ton miles that produce revenue." They may be right insofar as overall earnings are concerned, but the practice puts the maintainer behind the "eight ball" and requires him to explain a lot of things for which he is not to blame. Bad gear contours for example, can shake the best motor to pieces in a little while. The shop foreman of one such "tonnage road" visited another shop which upholds high maintenance standards. Upon looking at motors coming in for repair at this other shop, he said, "If I ever had a motor come in to me in that condition, I would put it back in service." He can scarcely be expected to develop high mileages between overhauls. It is unfortunate that some of the ton-mile revenues produced in this way can not be turned back to the shop to cover increased maintenance costs.

But there is another side of the picture. The man who is reaching for the "million-mile motor" may be overextending himself. Running a motor until it fails on the road with consequent train delay or something worse will quickly build up costs sufficient to pay for a lot of maintenance.

Almost always a motor failure involves insulation failure. Good insulation is life itself to a motor, particularly when that insulation is designed to live in the climate in which the motor must work. It is the most important of all factors involved in the effort to make the "million-mile" motor a reality. Specific information on this subject will appear in subsequent issues of Railway Locomotives and Cars.

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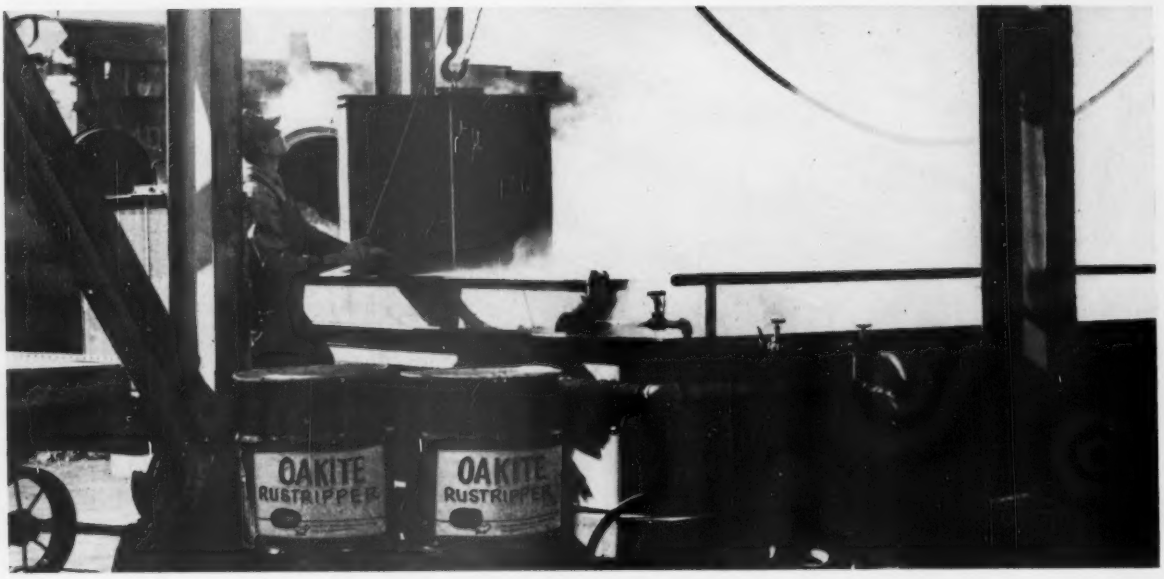

Oakite RUSTRIPPER® removes rust and paint, simultaneously... speed-cleans parts for salvage

These reports from Oakite customers tell how Oakite Rustripper slashes salvage-cleaning time and costs... by removing paint and rust in a single operation.

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"... doing a beautiful job in our parts cleaning tank, removing rust and synthetic resin-base paint."

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Since Oakite Rustripper eliminates the need for multiple tanks often required for degreasing and derusting, it adds more POWER to your MANPOWER. So does the entire line of Oakite materials and methods. They all give you the *important* advantage... LOW-COST *END RESULTS.*

Ask your Oakite man to show you how RUSTRIPPER can solve your toughest salvage problems. Or write for free bulletin to Oakite Products, Inc., 46 Rector St., New York 6, N. Y.

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years' leadership in industrial cleaning

Canadian National's new Montreal shop is pattern for diesel shops now building, or to be built, across Canada. High bay (left) contains tracks where heavier repairs and wheel work are done. Bridge crane back of this bay (far left) serves wheel-storage yard.

CNR 'Centralizes' Diesel Maintenance

Regional maintenance shops are being built which are laid out around central work and stores areas

CENTRAL WORK AND STORES AREAS with two-unit inspection tracks converging from two sides characterize the new diesel shop of the Canadian National at Montreal Yard. Outside the shop is a ¾-mile test track where locomotives can be operated at speeds up to 60 mph for load testing after their periodic inspections in the shop have been completed. These features will be incorporated in five major Canadian National running repair facilities, four of which are to be in service by 1962.

With dieselization almost completed, the CNR has recently undertaken a program of concentrating most running repairs for its locomotives at only a few points. A series of projects already under way will center CNR freight operations at five major classification yards along its lines across Canada—at Moncton, Montreal, Toronto, Winnipeg and Edmonton.

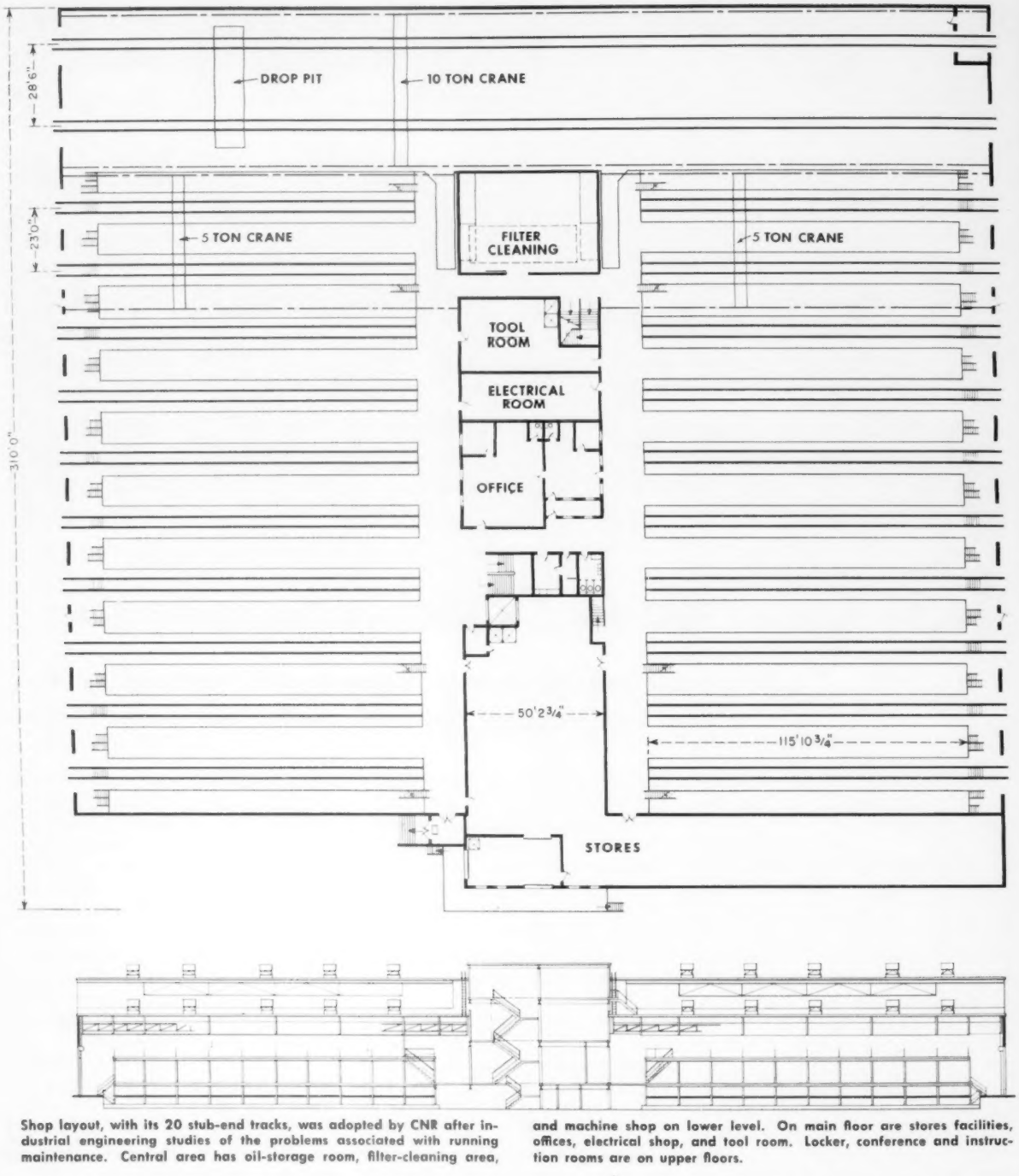
In conjunction with each of these yards, CNR has built, or plans, a major locomotive facility. It now develops that these five shops will serve as the focal points for scheduled maintenance and running repairs in the five regions. To date, the shops at Montreal Yard and Calder Yard in Edmonton have been completed. The shop at Moncton is to be completed this summer, and the facility at Symington Yard in Winnipeg is scheduled to go into operation in 1961. Recently the CNR announced the location of the new Toronto Yard, but the date for the completion of the locomotive facilities is still three years away.

All of the shops completed or planned so far will be similarly designed. Work areas and offices in each shop are placed in a bay through its center between, and at right angles to, the inspection tracks. Dead-end locomotive inspection tracks, each holding two units, converge on this area from both sides. One of the heavy repair tracks at the end of the shop does not run through. Montreal and Symington shops are designed with twenty two-unit inspection tracks each, and Moncton and Calder shops with sixteen two-unit inspection tracks each. While the size of the Toronto shop is undecided, its capacity is expected to be at least equal to that of the Montreal shop.

The idea for the work areas through the center of each shop originated with the production measurement program set up by the Canadian National four years ago. Since then, running repair shop operations have been analyzed and standard work units assigned for all operations. The Canadian National places so much emphasis on its production measurement program that each of its heavy repair and larger running repair shops has a production foreman who spends full time on industrial engineering activities.

With an analysis of the operations at these running repair shops, some of which were converted from steam facilities, the road produced an accurate break-down of its man-hours. Having analyzed the operations, it was then possible to set up in existing shops a series of work centers in which specialized groups confine their activities to specific operations and have there the tools and materials to do their jobs. When it came time to design completely new facilities, the analyses of operations and organizations played a major role in shop layout.

The use of a series of short dead-end tracks in a modern diesel shop has sev-

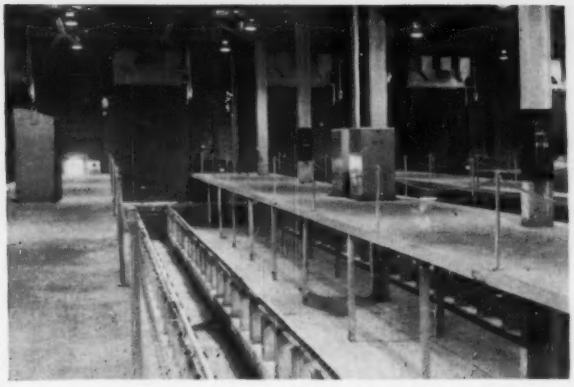


Shop layout, with its 20 stub-end tracks, was adopted by CNR after industrial engineering studies of the problems associated with running maintenance. Central area has oil-storage room, filter-cleaning area, and machine shop on lower level. On main floor are stores facilities, offices, electrical shop, and tool room. Locker, conference and instruction rooms are on upper floors.

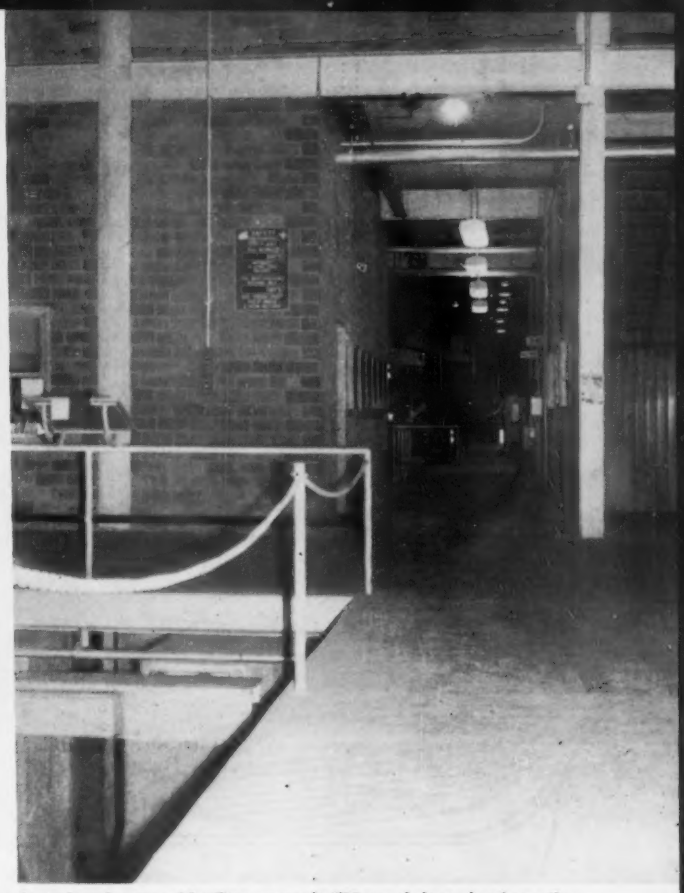
eral advantages as the CNR sees it. Once a unit is in such a shop, there is usually no need to move it until it is ready to leave. This is not the case with shops where four, five or six units may be lined up on a single track. Another advantage is that the movement of individual units is much less complicated when tracks are short and no more than one unit can be blocked in on a track. Centralizing shop facilities in this manner means that any unit in the shop is less than one minute walking time from the toolroom stores and offices. This feature, together with a complete intercommunication system, makes for more efficient supervision and reduces non-productive man-hours to a minimum. It also simplifies the movement of material in the shop and reduces the amount of movement between operations.

While two of the five shops have been completed to date, the one at Montreal went into operation first. It is slightly larger than Calder shop at Edmonton. While the yard at Montreal will not be in full operation until next year, the mechanical department moved into the locomotive shops early last year. Since then, mileage inspections on freight units tying up at Turcot Yard in downtown Montreal, 10

Exhaust hoods extend full length of inspection tracks. Fans in hoods are interlocked with heaters to maintain temperatures.



Inspection tracks, hold only two units each; only one unit can be "bottled up" by work on locomotive next to shop door.



Central work area, with offices, stores facilities and shops, has inspection tracks at both sides (pit foreground; tracks beyond passageway).

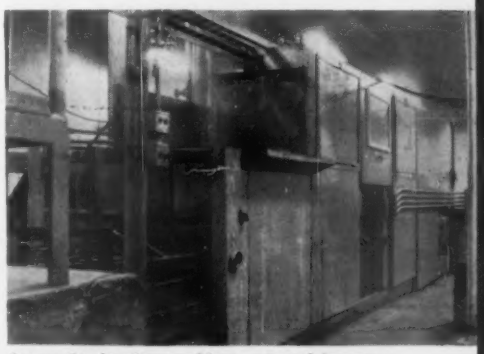
miles away, have been made at the new Montreal shop. By doing this, the CNR was able to prove the adequacy of its new locomotive shop design and discover objectionable features before they had been incorporated in all five of the new shops.

The road was encouraged to find that, actually, there have been very few of these. Major ones were the need for soundproofing offices, depressing the shop floor in the drop-table area, the piping of used lubricating oil directly from the locomotive inspection tracks, installation of reel lights in the lower of the three shop levels, and the addition of car-oil reels to supply oil for switching locomotive journals and for the suspension bearing on all locomotive units.

All through last summer, Montreal Yard shop served as a proving ground and, by early fall, there were 381 freight and switcher units assigned. It is expected that eventually there will be about 500 units assigned there. The other four shops will handle most of the remainder of the 1,900 locomotive units in the motive-power fleet. Heavy repairs for these locomotives will be made at Moncton shop in Moncton, Point St. Charles in Montreal, and Transcona shop in Winnipeg.

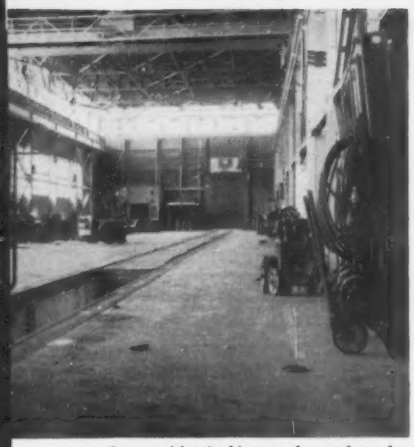
It should be emphasized that all of these new shops were built to perform only scheduled maintenance and running repair work. They will be equipped to do any maintenance on a locomotive short of removing an engine and generator, or making major wreck repairs. Typical of the regular heavy repairs will be the changing of turbochargers and air compressors. The periodic maintenance program to be handled does not include the changing of complete sets of power assemblies. In each shop it is intended that there will be a minimum of reclamation. Stocks of repair parts and the water and oil dispensing equipment are maintained on alternate platforms throughout the shop.

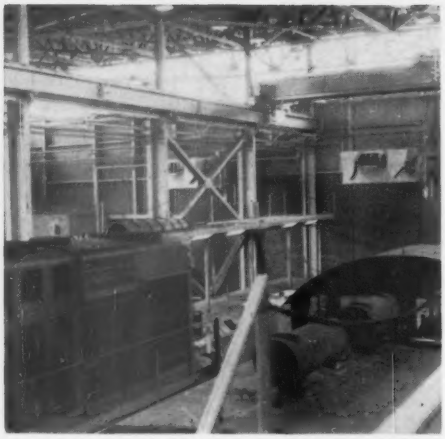
Road freight, road passenger, and road switching locomotives on the Canadian National receive periodic inspections based on mileage. Switching locomotives are inspected on an hourly basis. The operation of such a program such as this is somewhat less complicated in Canada, because the Board of Transport Commissioners



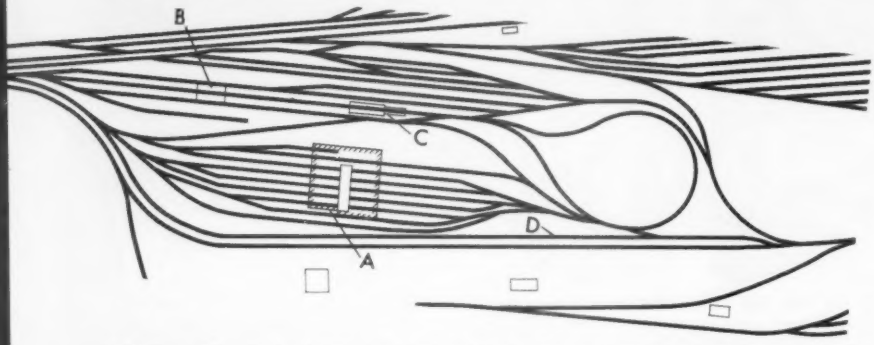
Automatic cleaning machine, operated by one man, handles filters for all units at Montreal.

Only light work is done in machine shop on lower level between inspection tracks.

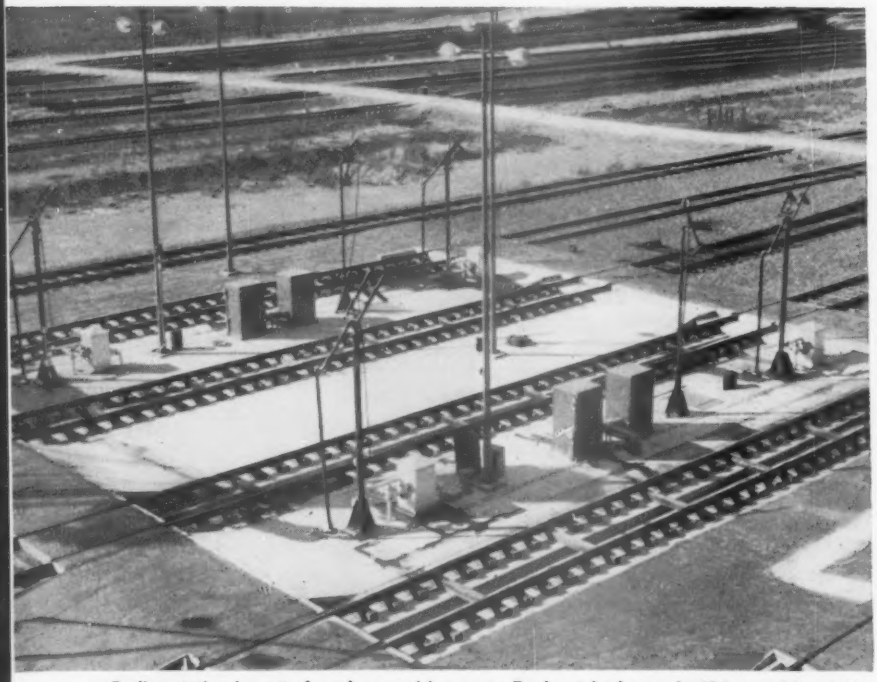




Drop table, jacking pads, and track-center pits (left) facilitate the changing of wheels. Roof-level work platforms and 5-ton overhead cranes are useful for heavier repair jobs on stub tracks in high bay (right).



Schematic of locomotive facilities at Montreal Yard does not show all tracks, but indicates important areas. Shop (A) has turning loops at each end. Trip inspections will be made outside before units are fueled (B) and washed (C). After units have been brought into shop for periodic maintenance, they are tested on track (D) which allows speeds up to 60 mph.



Fueling station is part of outdoor servicing area. Tracks at background will be used for storing units prior to their dispatch. Trip inspections will be done in outside area.

does not require monthly inspections. There are 44 units at Montreal Yard which are assigned for operation into the United States and receive regular ICC inspections.

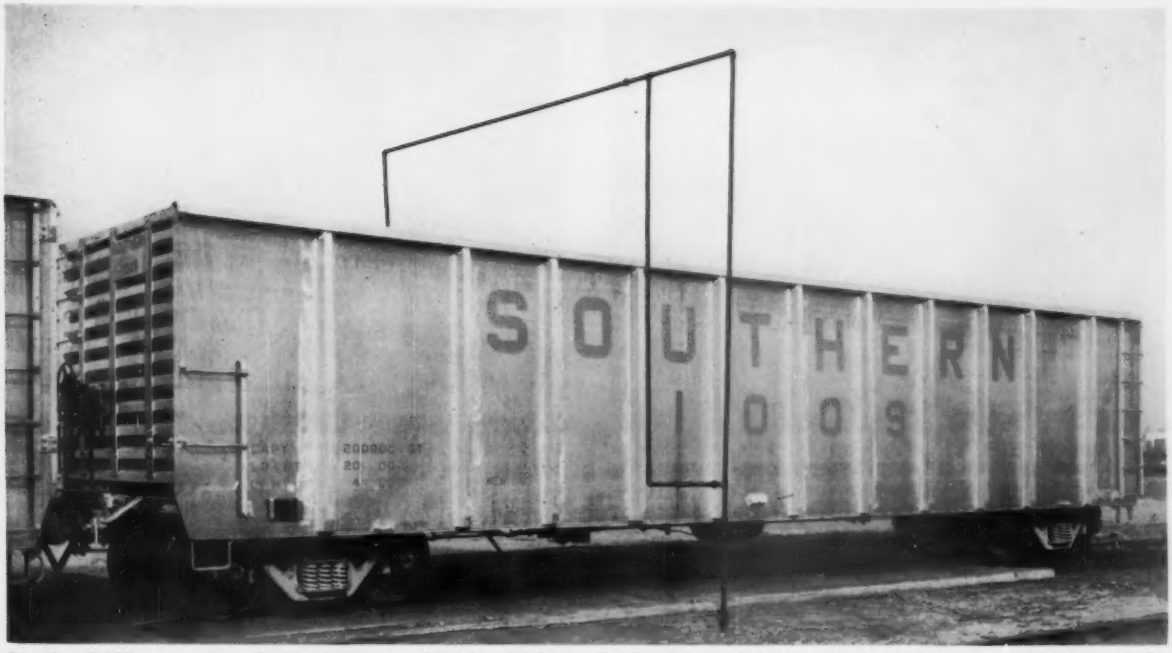
Maintenance Schedules

Items covered in the periodic maintenance schedule are based on the recommendations of manufacturers tempered with CNR operating experience. Currently, the inspection schedule for CNR Locomotives is as follows:

	Miles
Canadian Locomotive (F-M) road freight and heavy road switcher	7,000
Canadian Locomotive (F-M) 1,200-hp road switcher	6,000
Canadian Locomotive (F-M) road passenger	12,000
General Motors road freight and heavy road switcher	10,000
General Motors 1,200-hp road switcher	6,000
General Motors passenger	12,000
Montreal Locomotive (Alco) road freight and heavy road switcher	10,000
Montreal Locomotive (Alco) 1,000-hp road switcher	6,000
Montreal Locomotive (Alco) passenger	12,000
	Hours
General Motors yard switcher	700
Montreal Locomotive (Alco) yard switchers	700

An intermediate inspection calling for filter changes is scheduled for all of these units, except the Montreal Locomotive 1,000-hp road switchers, Montreal Locomotive yard switchers, and General Motors yard switchers. Lubricating oil on CNR locomotives is changed only on the basis of spectrographic analysis, so there are no regular lube oil changes in the scheduled program.

When Montreal Yard is in full operation, the mechanical department will handle trip inspections for all locomotives tying up there. For the present, the shop has been making about 230 mileage inspections on road freight and road switcher units each month; about 45 inspections on yard switchers. The trip inspections will be handled at outdoor pits on four servicing tracks which extend through the fueling and sanding facilities.



Capacity of 102 tons on four-wheel trucks was possible when Southern called for aluminum bodies on these gondolas. This order, 750 cars, is the largest ever placed for aluminum cars in North America. Magor is completing 455 covered hoppers with aluminum bodies for Southern.

Gondolas Have Aluminum Bodies

Pullman-Standard has just completed delivery of 750 high-capacity cars for Southern coal service

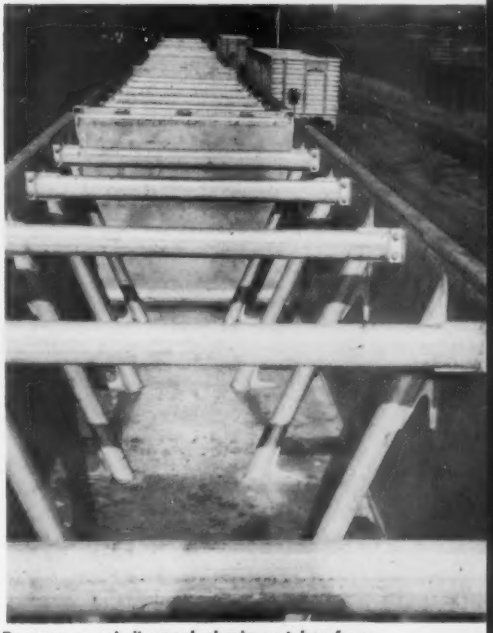
Delivery of the last of 750 aluminum-and-steel 100-ton gondolas for the Southern Railway has just been completed by Pullman-Standard's Bessemer, Ala., plant. Production has been at the rate of 16 cars per working day during most of the period since assembly operations started in January. The $15,000,000 order was placed last July (RL&C, August 1959, p. 41). These high-capacity gondolas are going into captive coal service. Car dumpers will be used for unloading.

The carbody and underframe are all aluminum, except for the center sill, parts welded to the center sill, and the brake system components. Average light weight of the completed car is 47,300 lb. It has a capacity of 3,620 cu ft. Length over strikers is 49 ft 5 in.; overall width, 10 ft 4½ in., and extreme height above rail, 11 ft 7 in. The inside length of the body is 47 ft 8 in.; the inside width, 9 ft 6⅞ in.

It is estimated that a comparable steel car would have a weight approximately 63,000 lb. Design of the aluminum car closely follows that of traditional steel gondolas. The light weight of the aluminum-and-steel car makes it possible to use four-wheel trucks with 6½- x 12-in. journals and have a load limit of approximately 102 tons.

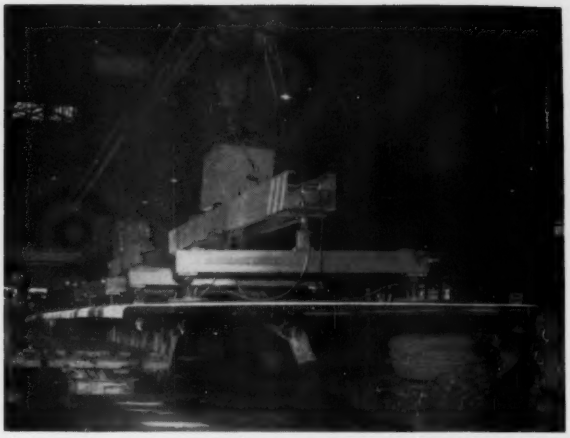
The steel center sill consists of two 51.2-lb steel AAR Z-sections welded continuously with 100 per cent penetration by the automatic submerged-arc process. The aluminum body bolsters and crossbearers are bolted and riveted to the sill, but the remaining 200 parts in the body are welded. An average of 15,000 lb of aluminum alloys are used in each car, and the assembly of each requires approximately 7 miles of welding wire.

The one-piece floor plate is ⅜ in. aluminum alloy 5454, and sides and ends are ⅜-in. alloy 5083. Special aluminum extrusions, used for body structural members, vary in thickness from ½ to ⅝ in. During fabrication,



Transverse and diagonal aluminum tubes form bracing for open top car. Transverse braces are bolted to brackets on the upper car sides.

Forming of floor sheets was done in 500-ton press. Fabrication of aluminum in large volume was new problem for Bessemer plant.



Vacuum lifting device was built to move large aluminum plates. Plates were kept clean as possible, were cleaned prior to welding.

these extrusions were bevel-sawed instead of flame cut or sheared.

The cars, because of their light weight, must be equipped with empty-load brakes. The Westinghouse automatic empty-load equipment includes 7-⅝-in. x 9-in. and 12-in. x 9-in. brake cylinders, QRR cylinder release valves, D-111-D automatic slack adjusters, and 2-in. Cobra brake shoes. Brakes are adjusted for 5-in. piston travel. All cars have Miner draft gears.

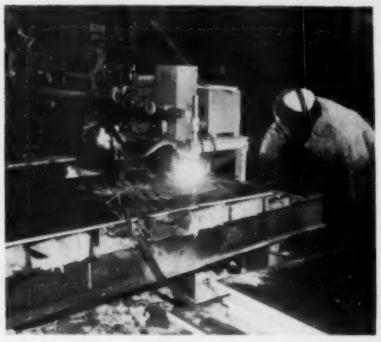
The Barber S-2 narrow-pedestal trucks are fitted with 2½-in. travel springs, AAR No. 18 Unit brake beams, and Stucki double-roller side bearings. Because of their high rail loadings, the cars have 36-in., Class CR, multiple-wear, wrought-steel wheels. Timken grease-packed roller bearings are applied to the 6½ x 12 in. journals. Two of these completed trucks weigh 21,000 lb.

At Pullman's Birmingham plant it took approximately 2½ months to set up the production line for these aluminum cars. One of the tracks normally used for production of Pullman's standardized freight cars was assigned for the Southern order. P-S called on its other plants at Hammond, Ind.; Michigan City, Ind., and Butler, Pa., to build jigs. A new 1500-ton Verson press was obtained for the fabrication of the sides and floor sheets. A special lifting device using vacuum cups was used for handling the aluminum sheets between the various fabrication and assembly operations.

It is generally conceded that this has been one of the largest production line assembly operations in which structural aluminum has been involved.

Pullman relied on modern electric cutting and welding processes for economical production. Over $300,000 was spent on welding equipment, including 175 manual and 36 automatic aluminum welding units. The welding process, gas-shielded metal-arc uses the inert gas to protect the weld pool from atmospheric contamination during welding. Argon, the inert gas, was supplied by a Linde VCC 150 liquid argon installation with capacity for the extensive requirements.

A special 13-head welding machine using Air Reduction equipment was built to weld the extrusions on the end sheets at one step in the assembly operation. Other Aircomatic machine heads were used to apply top angles and side stakes to side sheets. Heliarc cutting equipment eliminated the need for expensive dies to form intricate sole plates.



Shape cutting machine carriage with Heliarc cutting torch was used to shape sole plates.

Assembly of the car required a great deal of hand welding. Aircomatic and Sigma manual units were used both for tack and finish welding of the body and subassemblies. Pullman-Standard welders had not previously used the gas-shielded metal-arc process, and it was necessary to establish a training program.

Partial List of Materials and Equipment

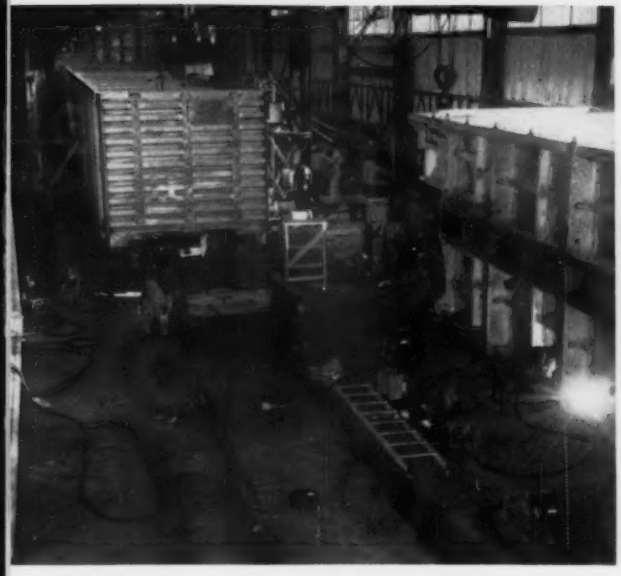
Truck side frames and bolsters	American Steel Foundries
	Scullin Steel
Wheels and axles	Baldwin-Lima-Hamilton
	Bethlehem Steel
	United States Steel
Roller bearings	Timken Roller Bearing
Brake shoes	Railroad Friction Products
Brake levers	Schaefer Equipment
Air brake equipment	Westinghouse Air Brake
Hand brake	W. H. Miner
Brake steps	I. Morton
Aluminum plate and shapes	Reynolds Metals
Center fillers	Pullman-Standard
Side bearings	A. Stucki
Draft gears	W. H. Miner
Couplers and yokes	National Malleable
	Symington-Gould
Coupler centering device	Standard Railway Equipment
Defect card holder	Railway Devices

Floor assembly jig holds underframe so that welding can be completed. Work was placed so that downhand welding was possible.

Extrusions were welded in special 13-head machine for form the ends of the car. Application of top angle on side was also machine weld.

Steel center sill and aluminum bolsters and crossbearers were joined by riveting and bolting to form the gondola underframe.

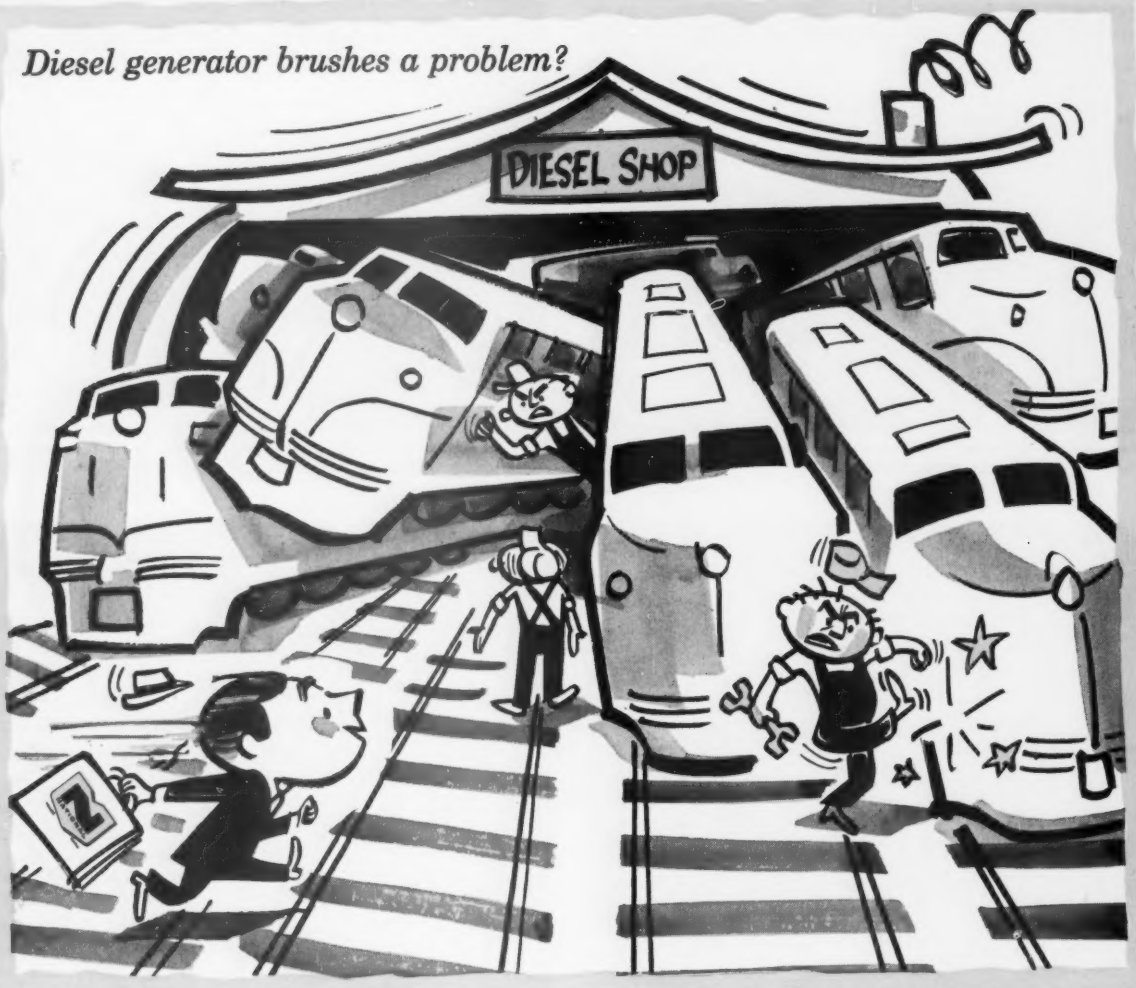
Sides were initially tacked in assembly and subsequently finish welded. Transverse braces are being bolted to angle brackets.



Handbrake is applied just above the end sill and retainer valve is applied to car side so it can be reached from the ground level.

Final welding of carbody was done with cars positioned so that hand work could be done downhand. To do this cars were lifted from trucks and rotated. Final welding operation is shown on the front cover.

Diesel generator brushes a problem?



Your NATIONAL brush man helped this road stop excessive maintenance!

JOHN PEDLAR

PROBLEM: Serious copper dragging and flashovers.

RECOMMENDATION: "National" brush grade DE-2.

RESULTS: This road now considers its generator brush operation completely satisfactory.

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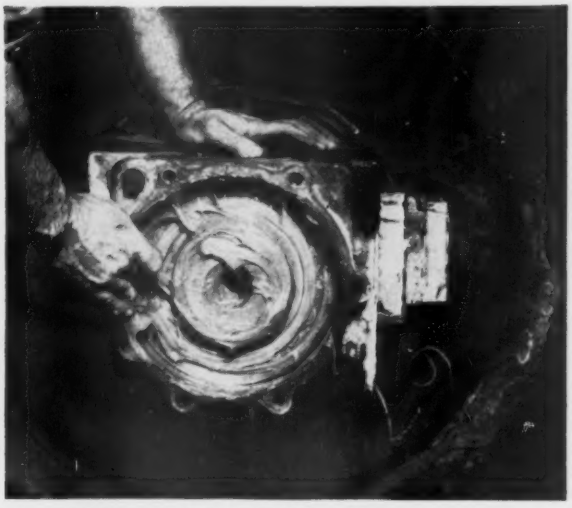

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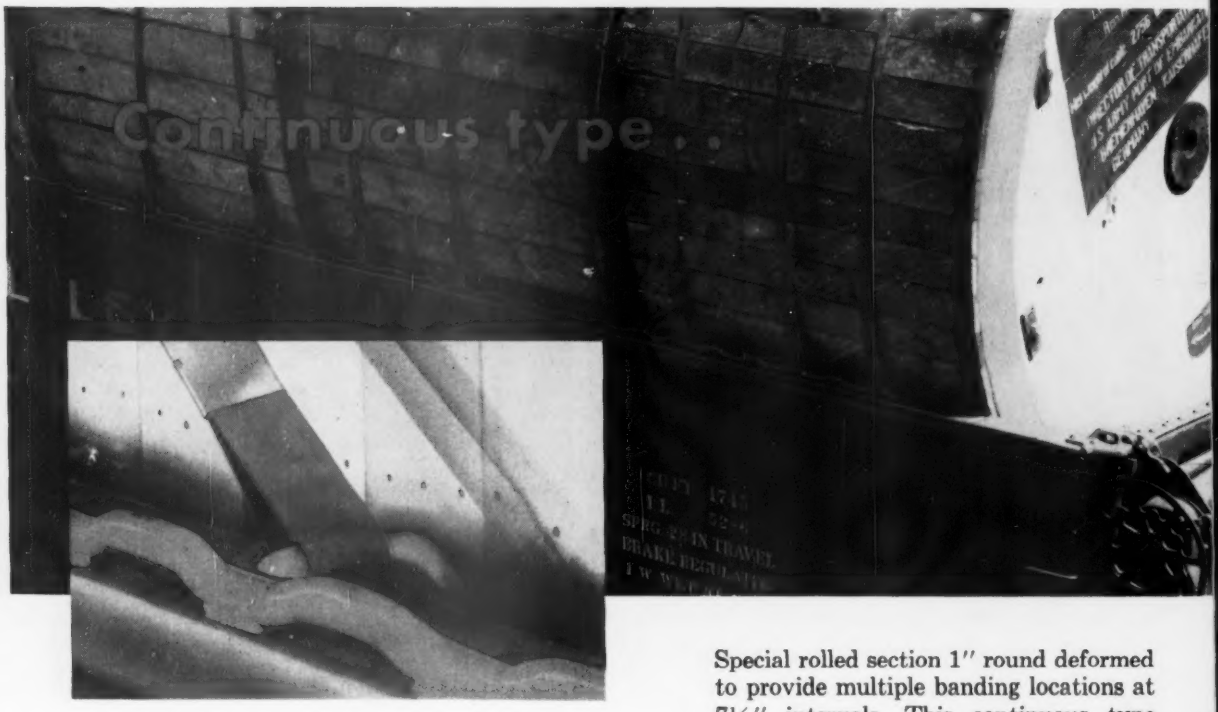
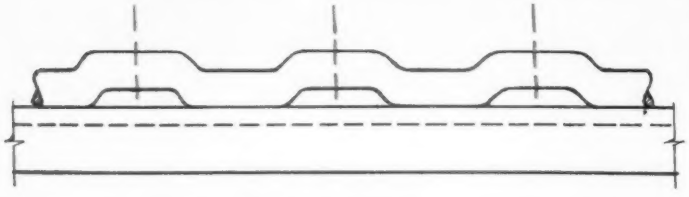
LADING BAND ANCHORS

Designed for Maximum Utility

Designed especially for both gondola and flat car application. Welded to position, both types afford easy band access and fully rounded contact surfaces.



. . AN ANCHOR EVERY 7½ INCHES



Special rolled section 1″ round deformed to provide multiple banding locations at 7½″ intervals. This continuous type anchor is best adapted to the top coping of gondola cars. Composite lengths available for various car design requirements. Individual cast steel anchors for end strapping complete the application.

Assignment of special track for use by track car has expedited the inspection of important freight trains at the RF&P Richmond yard.

Inspector's Car Speeds Yard Operation

RF&P uses track car to expedite train inspections; it makes possible on-the-spot decisions by supervisor

New car inspection and repair service techniques have enabled the Richmond, Fredericksburg & Potomac to reduce yard delays at Richmond, Va., by at least 65 per cent. Assignment of one yard track for use by a special car foreman's track car makes it possible to get maximum utilization of manpower, materials, and tools while simultaneously keeping train detentions to a minimum. It makes possible direct supervision of inspections and repairs which go on along the mile-long freights which the RF&P operates over its line.

Interchange inspections on manifest trains, including repairs, such as rebrassing, and operations, such as the closing of hopper doors, are frequently completed in as little as 30 min with trains of up to 125 cars. From Richmond, these trains then move over the 107-mile RF&P main line to Potomac Yard in Alexandria, Va., where they are classified for movement to northern cities.

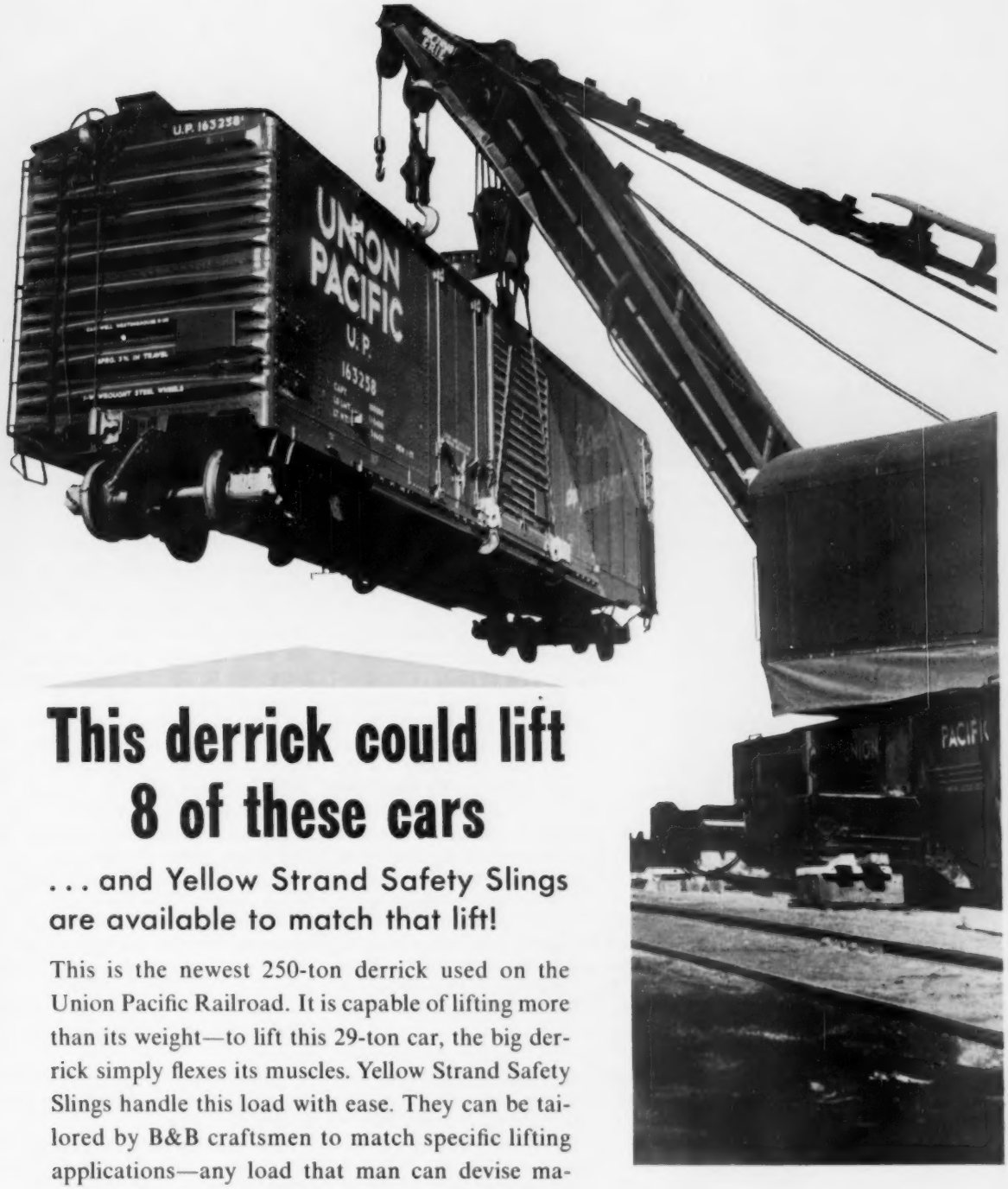
Because there is almost no classification necessary on northbound trains, blocked as they are by the ACL and SAL at points south of Richmond, the RF&P's Richmond car inspection operation is comparable to that performed at intermediate terminals on longer railroads. When it comes to the actual mechanics of this operation, the road has displayed real ingenuity.

The RF&P purchased a Fairmont A-3 gang car, which has now been fitted with running boards, tools, materials, floodlights and radio to make it a rolling car foreman's office, toolroom, and stores facility. During those periods of the day when northbound manifests follow one another into Richmond yard, this track car makes it possible for the car foreman to move his men and tools from operation to operation with minimum delay. At the same time, this arrangement makes possible direct supervision and on-the-spot decision by the foreman.

While the goal of "spot" car repair systems set up by many railroads recently has been "taking the work to the man," the theme of the RF&P Richmond operation might be summarized as "taking the man to his work." This does not mean that walking is eliminated; the RF&P still gives trains the scrupulous on-the-ground inspection possible when pairs of inspectors simultaneously walk and check both sides of a train. It does mean that inspectors are delivered by the track car at intervals along a train so that inspections begin at several points on an arriving train almost simultaneously.

Prior to the arrival of a train, the yardmaster tells the foreman of its arrival, length, and track assignment. This can be done over the yard speaker system, or on the walkie-talkie radio which the track car carries. The standard procedure is to assign one yard track almost permanently to the car department and to bring all incoming manifest trains in on the two tracks

(*Continued on page 36*)



This derrick could lift 8 of these cars

. . . and Yellow Strand Safety Slings are available to match that lift!

This is the newest 250-ton derrick used on the Union Pacific Railroad. It is capable of lifting more than its weight—to lift this 29-ton car, the big derrick simply flexes its muscles. Yellow Strand Safety Slings handle this load with ease. They can be tailored by B&B craftsmen to match specific lifting applications—any load that man can devise machinery to lift. For complete information call your B&B Railroad Representative, or write us—today! Broderick & Bascom Rope Co., 4203 Union Blvd., St. Louis 15, Mo.

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WIRE ROPE

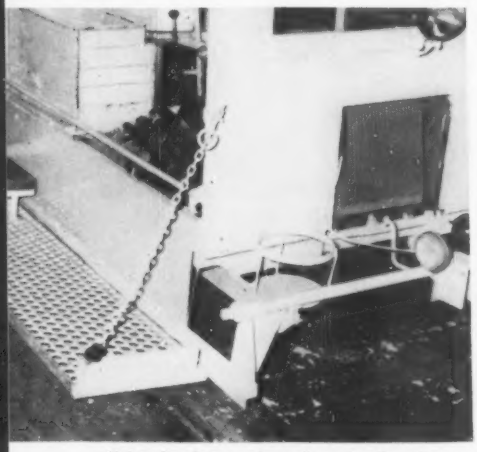
SLINGS

CLIPS

Foreman can make rolling inspection of train from operator's position on track car. Walkie-talkie enables him to contact yardmaster.

Folding running boards provide location from which inspector can check trucks and underframes of cars while track car moves along.

Special lock protects tracks used by inspection car. Other end of mile-long yard track is protected by towerman who operates switch.



Lights, brackets, racks and running boards were installed on Fairmont gang car by RF&P.

which flank this one. The track used by the track car is adequately protected so no switching moves can be made over it.

With up to eight car inspectors available, the foreman assigns segments of an incoming train to pairs of these inspectors. The car repair facilities at Richmond yard are at the south end and an incoming northbound train pulls past this point. It is here that the car foreman usually has his inspectors board the track car. With a 120-car train arriving, he will leave the first pair of inspectors at the point where the caboose can be expected to stop. He will then proceed north along the train as it pulls in, giving it a quick visual inspection and leaving pairs of inspectors at 30-car intervals. When the train finally stops, inspections can begin at four points along the length of the train.

If one team of inspectors finds a car which needs a new brake shoe or other work which can be done without cutting the car out, they stop their inspection and go ahead with the repairs. This means that other men will then complete the inspections originally assigned to the first pair. Stocks of materials, such as brake shoes, brasses, pins, and keys, are stocked in material boxes along the track and are also carried on the track car.

When the job requires materials, tools, floodlights, or a decision by the foreman as to whether a bad-order car is to be repaired in the train, inspectors signal the foreman who comes to the point on his track car. If it is necessary to make a set-out, the foreman calls the yard office with his walkie-talkie. Early detection of bad orders frequently enables the switcher to cut the car out while it is changing cabooses, or before the RF&P road locomotive has been coupled to the train.

Once inspection has been completed, the track car can be used to bring inspectors back to the car repair track. They can then go back to work on bad-order cars, or be ready for assignments on other incoming trains, or on cuts of cars which are delivered to the yard and inspected in more conventional fashion. The track car is frequently used to move men and tools back and forth through the yard, even though through freights are not involved.

Utilization of a track car as the RF&P has done has the following advantages:

- It eliminates walking to widely dispersed assignments, increasing productive time;
- It makes possible close supervision of these dispersed operations and simplifies their coordination;
- It provides a mobile radio station which makes it unnecessary for each inspector to carry a walkie-talkie;
- It provides a quick way to transport tools and materials, as well as men, over a wide area;
- It reduces train detentions which assists in holding and gaining traffic. For a short road like the RF&P, per diem charges can be greatly reduced.

N&W Will Build 85-Ton Hopper Cars

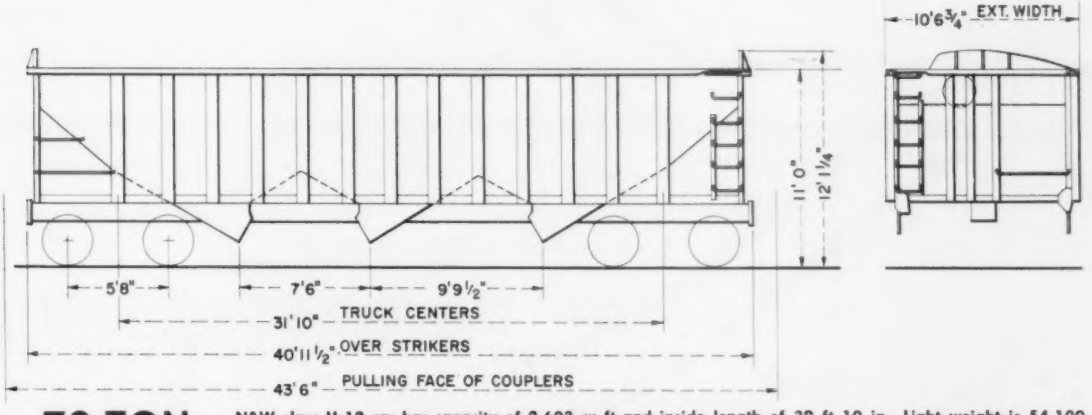
Design of big roller-bearing car has been completed; could become a new standard for coal transportation

CHANGES IN THE PATTERNS of coal consumption and transportation have resulted in the order for 1,000 hopper cars of 85 tons capacity which has just been placed by the Norfolk & Western. The N&W Roanoke, Va., shop will build the hoppers at a unit cost of $12,000 starting next August. They will be the first group of Roanoke-built cars to be equipped with roller bearings. There are indications that this 85-ton car may become increasingly common on the N&W during the next few years. This size of hopper is new, not only to the N&W, but to all U.S. roads.

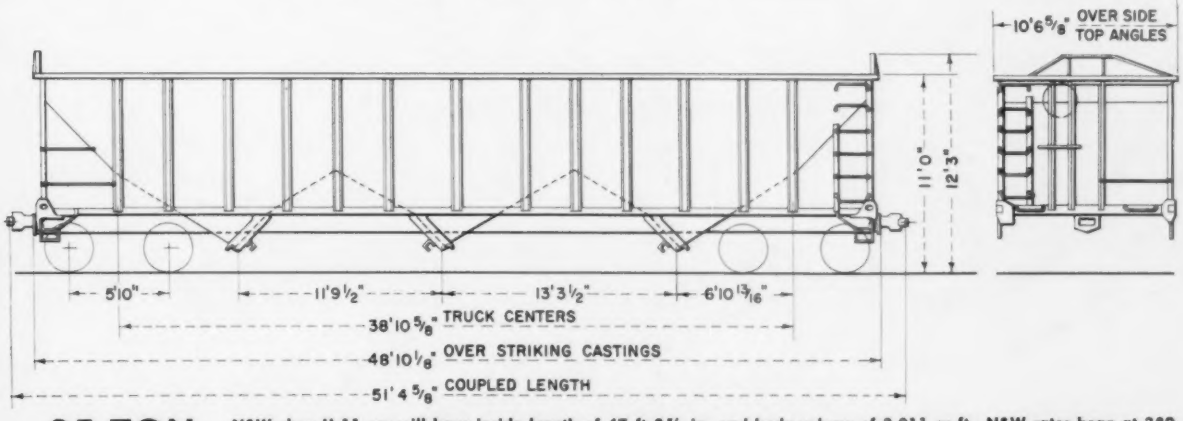
Movement of coal to electric utilities and steel mills and for trans-shipment at lake and ocean ports steadily increases in volume and in importance for the N&W. It is an advantage for customers of this type and for the railroad to have the largest cars which are economically feasible. Having determined that only four-wheel trucks could be justified in its quest for high capacity, the N&W began to design a car with 6½- x 12-in. journals, which allows an on-the-rail weight of 251,000 lb. It developed that not all N&W connections would accept a car with a gross weight of 251,000 lb. A car of 240,000 lb gross weight could pass through almost all N&W interchanges. Design work then proceeded with the aim of achieving maximum capacity within the 240,000-lb figure, and it was because of this that the nominal 85-ton hopper emerged in place of the 90-ton car which was originally planned. The car retains the 6½- x 12-in. axles.

The alternate standard 70-ton hopper car with outside side stakes, recently adopted by the AAR (RL&C, Feb. 1960, p 7), is based on work undertaken over two years ago by the Chesapeake & Ohio, Norfolk & Western and Pennsylvania. Sample cars built by each of the three roads were subjected to an extensive test program at the Technical Center of the National Malleable & Steel Castings Co. in

(*Continued on page 40*)



70-TON N&W class H-12 car has capacity of 2,603 cu ft and inside length of 39 ft 10 in. Light weight is 54,100 lb. Change in slope of end floor sheets at bolster is characteristic of this car which is prototype for recent alternate standard design adopted by AAR letter ballot action.



85-TON N&W class H-11 car will have inside length of 47 ft 8⅛ in. and body volume of 3,011 cu ft. N&W rates heap at 389 cu ft producing total of 3,400 cu ft. Clearance of hopper frame above rail is 16⅜ in. Cars will be built of high-tensile, corrosion-resistant steel with estimated light weight of 65,000 lb.

PS-1 BOX CAR

The pioneer of freight car standardization, Many of the PS-1 original, exclusive and standard features have now become standards for the industry. Constant new improvements in construction and versatility keep it the leader in its field.

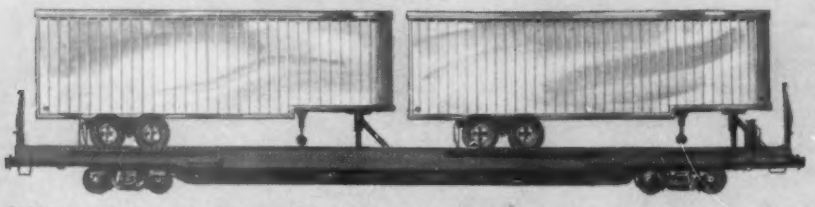
PS-2 COVERED HOPPER CAR

Flexible standardization at its best with such new features as eleven-inch clearance at outlet gates, varied and increased capacities . . . built-in railroad and shipper advantages from rail to roof.

PS-5 GONDOLA

Typifies P-S flexible standardization. PS-5 combines the economy and quality of standardization with sufficient design versatility to meet the varied but consistently rugged use requirements of gondolas.

PS-4PB PIGGYBACK CAR



85′ long and all stamina! New unitized construction joins underframe and body members into a single, strong, all-welded structure for high-tonnage, high-revenue hauling. In the last 18 months Pullman-Standard has built or received orders for 2400 eighty-five foot PS4-PBs, the largest number of piggyback cars of any one type produced by any carbuilder.

P-S FULL LINE STANDARDIZATION

to meet the transportation challenge of the '60s

PS-3
OPEN HOPPER CAR

Built to meet the prime requirement of hopper cars—tremendous durability. The PS-3 shoulders relentless punishment from shakeout machines, clam shells, and turn-over dumpers. All-welded construction and extra strength where it counts result in longer low maintenance life.

There are opportunity years just ahead, stemming from our abundance of youth . . . new population, new industries, new shippers. These years will follow one of the most progressive periods in railroad history, which Pullman-Standard saw as its first full decade of standardized freight car production.

Now the railroads will meet the challenge of the 'sixties—develop even faster, better, cheaper, more automated transportation, and more of it! Against this challenge, Pullman-Standard puts standardized rolling stock—now a full line coming out of the proving grounds of the 'fifties.

Each car of the P-S line is a tested, proved and capable product. Each car has its own success story . . . the result of exhaustive design research, fact digging, laboratory and service proving, plus scores of improvements and refinements . . . more than 270 in the PS-1 box car alone since its inception in 1946. Nearly 130,000 P-S standardized freight cars attest to the success of the standardization concept.

Scores of railroads and other users in the 'fifties have sampled the results: freight cars, parts, lading protection devices and specialties of unprecedented durability, economy and versatility. Now count on the new, full, perfected, P-S line to help you meet the challenge of the 'sixties—profitably!

GET THESE TWO BOOKLETS—One puts the full line of standardized freight cars, lading protection devices, specialties and parts in your hands for fingertip reference. The other tells how the full standardized P-S line is available to equip you to meet the full challenge of the 'sixties. Ask your P-S representative, or write for these two informative booklets.

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DESIGNED TO PRODUCE P R I MEMBER

(*Continued from page 37*)
Cleveland. Tests were so successful that the three lines are committed to the design when acquiring additional 70-ton cars. To date, the Pennsylvania has ordered over 10,000.

The 85-ton hopper which the N&W will build is to be an elongated version of this 70-ton standardized car. Plate thicknesses and structural sections in the two cars are the same. Most of the design features are duplicated. Increasing the length over strikers from 40 ft 11½ in. in the 70-ton design to 48 ft 10 in. in the new design increases the cubic capacity from 2,603 cu ft to 3,011 cu ft, sufficient for the 85-ton rating.

Riveted Sides

The car is welded, with the exception of the riveting used on side stakes, top and bottom chords, center filler castings, strikers and safety appliances. Riveting of sides assists in combatting damaging effects of car shakers. This was demonstrated conclusively during the course of the National Malleable test program with the 70-ton standardized cars.

The car will have a center sill formed of 41.2 lb. AAR sections, and the top side and top end angles are 5- x 4-½ in. bulb sections weighing 19.1 lb. per ft. Body bolsters are formed from 24-in. wide-flange beams weighing 84 lb per ft. The two transverse ridges are supported by 16-in. wide-flange beams. Cast diagonal braces will be used between the transverse ridges and the upper sides. The 26 side stakes are to be hat sections pressed from ¼-in. plate. The cars will have cast-steel hopper door frames.

As is the case with the standardized 70-ton car and with some earlier N&W hoppers, these new cars will have end floor sheets with a 42-deg 12-min slope from the end sheet to the bolster and a 30-deg slope from there to the hopper openings. The upper floors are 5/16-in. plate and the lower floors and transverse ridges are ⅜-in. plate. Side plates are ¼-in. alloy, high-low tensile, corrision-resistant steel. In fact, all plates which contact lading are to be this LAHT material. The N&W did not utilize the higher tensile strength of the material to reduce the thicknessess of body components, but kept it at the same dimensions which would have been used with carbon steel. Result is predicted to be an appreciable increase in body life. The estimated light weight of the 85-ton car is expected to be 65,000 lb.

With this weight, it will not be necessary to use empty-load brakes. The car will have standard AB 10 x 12, single-shoe brakes with manual slack adjuster. To conform with latest AAR recommendations on rail loads, the car will have 36-in. multiple wear wheels. Trucks will have 5-ft 10-in. wheel base, and will be fitted with 2½-in. travel springs. The cars will have conventional draft gears and E couplers.

The 85-ton car is to be built at a cost of $12,000 as compared with $10,090 for the standardized 70-ton model with equivalent specialties. The N&W has summarized the advantages of its new design to include: lower first cost per ton of capacity; lower light weight per ton of capacity; shorter length per ton of capacity; reductions in periodic maintenance costs, such as repacking and repainting; savings resulting from reduction in number of units to be switched and handled; savings resulting from reduction in clerical work; reduction in number of units to be dumped at ports, and reduction in air-brake problems because there are fewer brake components and connections in a train.

The 85-ton car will not be as universally acceptable in interchange as 70-ton cars. Some retail coal dealers will not be interested in them. Such restrictions on acceptance will mean some additional switching to confine the high-capacity cars to certain shippers, routes and consignees. The cars will reduce the N&W's per diem receipts.

The cars are to go into regular revenue service. The N&W has an approximate 17-day turn-around for its active hopper-car fleet. Because industrial consignees which can receive these 85-ton cars are better equipped for rapid unloading than is generally the case, the road anticipates that there may be some improvement in car utilization. "Building of these original design cars," the N&W states, "is a milestone in the effort of this railway to furnish a better coal transportation service which will benefit industrial and other coal consumers."

Class H-12 car was built for test program at National Malleable. While Norfolk & Western has since built 70-ton cars at Roanoke, they did not conform to this design because material had been ordered prior to adoption of standardized arrangement by three railroads.

Slim Gets Crossed Up

By C. Charles

Ken, the road foreman of locomotives, was sitting in his office one Saturday morning contemplating the past week's train performance. There were no failures and the on-time record was good, considering the tough weather. There had been no more reports of trouble resulting from the multiple-unit operation of locomotives having the new 26-L brake equipment with older locomotives having 24-RL equipment.

That problem, solved by posting a bulletin two weeks earlier, arose from the improper connection of hoses between units. Now, when a 26-L unit is to be operated in multiple with a 24-RL unit, the Brake Cylinder Equalizing pipe on the 26-L locomotive is connected to the Independent Application and Release pipe on the 24-RL unit. If a 6-SL unit is to be operated with a 26-L unit, the corresponding air hoses on these two are connected, and the actuating pipe on the 26-L unit is cut out.

Recently, another problem had arisen. This was multiple-unit operation of three locomotives, each equipped with a different brake equipment—24-RL, 6-SL, and 26-L. The road's 6-SL units had never been changed for multiple operation with units equipped with the 24-RL brake. This had been also solved by having the three units operate with the 24-RL unit in the lead, the 26-L unit (in Trail) coupled to the 24-RL unit, and the 6-SL unit (in Trail) operated behind the 26-L unit.

Our brake problems seem pretty well resolved, Ken thought. This ended almost immediately as Slim, the road foreman of locomotives, walked into the office with a scowl on his face. Slim had troubles—brake troubles. An engineman had been unable to control the speed of his freight train. The train was not long, but every car was loaded so the engineman had needed all the braking he could get. The brakes had failed to apply on a brand new locomotive equipped with the 26-L brake. This unit was trailing the lead locomotive, one equipped with the 24-RL equipment. The engineman had tried everything he could possibly think of to get braking on the trailing unit, but to no avail.

Asked where the locomotives were, Slim replied: "At the shops and the air-brake man is trying to locate the trouble." George, the air-brake instructor, had heard of the trouble and was going over diagrams of the various components of the 26-L brake, trying to pinpoint the trouble.

This finally led to the F-1 selector valve. This valve, George figured, responds to positioning of the MU-2A valve so the brake on the locomotive will perform satisfactorily as a lead or dead unit, or as a trailing unit in multiple-unit service. The trouble must be either at the MU-2A valve or the F-1 selector valve. Because the F-1 selector valve's position is normally controlled from the MU-2A valve, the trouble must be in the MU-2A.

Arriving at the shops, George asked the air-brake man to check this MU valve. The valve was removed from the locomotive and taken apart. The O-rings were in perfect condition and the piston worked smoothly. The valve was replaced on the locomotive. In the meantime, George was looking over his diagrams of the MU-2A and F-1 selector valves. While George was doing this, the mechanic was having some trouble coupling the 53 and 63 pipes to the fittings on the MU valve. Finally, he called to George: "These pipes shouldn't be as tough as this to couple up. They seem to be sprung." They began to trace the pipes from the MU-2A valve to the F-1 selector valve. Sure enough, pipe 53 had been coupled to the 63 pipe connection and pipe 63 had been coupled to the 53 pipe connection at the locomotive builder's plant.

Taking one more careful look at his diagrams, George said, triumphantly, "Here's what caused our trouble." The pipes were connected correctly. Brakes were tested from the 24-RL unit and both the independent and automatic brakes applied on the 26-L unit.

George was besieged with questions. He explained the operation of these two valves to Ken and Slim. "Look at the diagram of the MU-2A valve in Trail 24 position. Notice that the spool valve blanks ports 2 and 20, while ports 3 and 53 are connected to the exhaust at the MU-2A valve. Main reservoir air from port 30 is fed to port 63 in the MU-2A valve, which, in turn, is connected to port 63 of the F-1 selector valve. This positions the selector valve to permit the brake-cylinder equalizing pipe air, port 14, to flow to port 20 and then through the double check valve to port 16 at the J-1 relay valve during a brake application from the lead locomotive. In other words, it produces an independent brake application.

"Let's now go on and check normal operation of the automatic brake. When the 26-L equipped locomotive is trailing a 24-RL locomotive, main reservoir air pressure is supplied to

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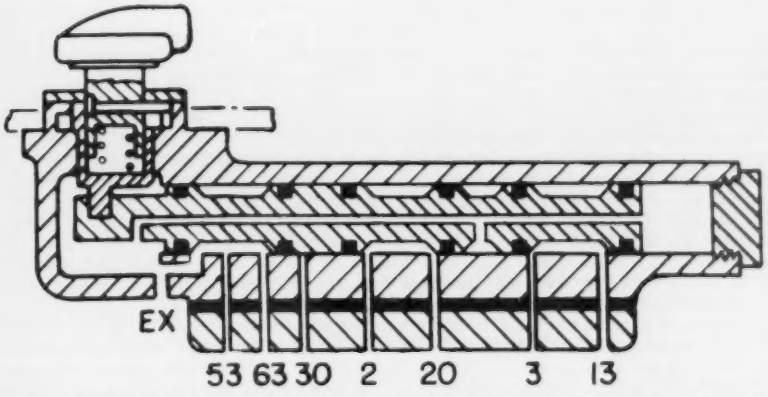
This is the third installment in a series on the 26-L brake. The first two appeared in the June and October 1959 issues of RL&C, pages 51 and 60, respectively.

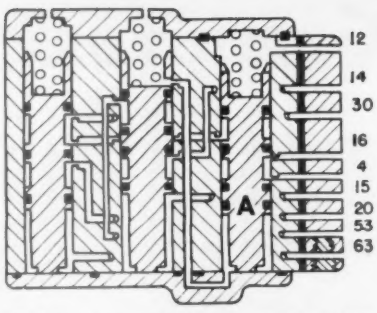


Lead position of MU-2A valve (above) blanks port 30 and vents 53 and 63 to atmosphere. In Trail 24 position involved in this episode, the spool is moved to the extreme right.

connection 63 at the MU-2A valve to position the spool valve of the F-1 selector valve. In this position, air flows from connection 16 at the 26-F control valve to connection 4 of the F-1 selector valve. Here it is connected to port 16 and then to the locomotive relay valve to develop brake-cylinder pressure. Brakes on the trailing locomotive are actuated by an automatic application initiated by the leading 24-RL locomotive."

Ken and Slim had been listening attentively to the description of normal operation. Now they were impatient to know what happened when the 53 and 63 pipes were crossed.

George said; "Let's go on." "Notice that pipe 53 is normally connected to atmosphere at the MU-2A valve; main reservoir air flows through pipe 63 to the F-1 selector valve. In this case, pipe 63 is connected to the atmosphere and pipe 53 is now charged with main reservoir pressure, which flows to the F-1 selector valve and moves the transfer spool valve to cut off air from the control valve between pipe 4 and pipe 16. This nullifies the brake application.



Transfer valve spool (A) was moved up from its normal position so that passages 4 and 16 were blocked, nullifying application.

"When this MU-2A valve is in *Lead* position, the crossing of pipes 63 and 53 would not create a problem, because both are open to the atmosphere in Lead position. When this locomotive had its MU-2A valve in *Trail 6 or 26* position, the main reservoir pressure in pipe 30 was joined to pipes 53 and 63. This would not create a problem, because the F-1 selector valve would be in correct position for multiple operation."

New Problems in Car Interchange

This is the twenty-third installment of a series of questions and answers on the Association of American Railroads Code of Rules Governing the Condition of, and Repairs To, Freight and Passenger Cars for the Interchange of Traffic which may help car men clarify their understanding of the philosophy, intent and requirements of the Interchange Rules. The answers given to the questions are not to be considered interpretations of the Rules of Interchange, which can only be rendered by the Arbitration Committee acting officially. The comments, however, come from a background of intimate association with the application of the rules. Obviously, comments or opinions as of today may be inapplicable after a revision of the rules or further interpretations by the Arbitration Committee.

If receiving road does not want to handle cars equipped with Allied Full Cushion trucks in its passenger trains, may it reject such cars when offered in interchange? (248)

Yes. Passenger Car Interchange Rule 2 allows individual railroads to reject in interchange any car not meeting its requirements for passenger-train operations.

May the receiving road issue defect card against the delivering line for the expense of closing the hopper doors of an empty covered hopper car accepted in interchange? (249)

No. Covered hopper cars are not covered by Rule 35. The shippers of some commodities require that the discharge doors be left open on some hopper cars in return movement to permit discharge of loose material left therein. In cases where the interiors of such cars might suffer damage because discharge doors are left open, the consignor and consignee of each individual shipment should arrange to have the openings closed before empty cars are moved.

In many cases where either improper repairs or partial repairs are made to a foreign car, it becomes necessary to attach a defect card. In such cases, should a notation be placed on the billing repair card to indicate that this was done? (250)

Yes, it is very important that this be done in all cases. Such action provides information which is very helpful to the car owner in getting complete repairs made to such cars as soon as possible, thereby making them fit for first-class service.

What procedures should be followed in preparing charges for repairs made to DF loader equipment? (251)

This equipment is considered a part of the car and repairs to, or renewals of, such equipment are chargeable to car owner under Rules 101, 105 and 107.

In lieu of issuing its defect card for separate uncarded, unfair usage damage on a car which it delivers home to car owner, is a delivering line justified in requesting the car owner to make a complete investigation to determine where damage occurred just because it has no record of damaging such car while the car was in its possession? (252)

No. The delivering line has no right to make such a request. If it failed to protect itself when car with old damage of a cardable nature was received in interchange, it must accept the consequences and promptly issue its own defect card for such damage.

What is the reason for the last sentence of Paragraph (b-1) of Rule 66 which reads: "Wooden dust guard plugs must not be used unless secured with a device to securely lock plug in place?" (253)

Because without adequate securement, wooden plugs often bounce out and are lost, permitting the entry of water and dirt in journal boxes. On tank cars, in particular, missing or improperly fitted dust-guard plugs are undesirable because of the lack of overhead protection.

Is it permissable to remove from service cast-iron wheels which have built-up tread? (254)

Yes. See Section (d-1) of Rule 75.

Does the specified charge of $30 in Paragraph (b-3) of Section A of Rule 112 for unloading apply in cases where badly damaged car is loaded in two cars and sent home to owners for repairs? (255)

Yes. The same charge applies regardless of the number of cars in which the damaged car is loaded.

Is charge permissable for straightening certain safety appliance details on car on authority of defect card rather than the RR&R of such items? (256)

Yes. With the addition of new note to Section (a) of Rule 108, such charges are now permissable on seven different safety appliance items. In the interest of conserving time and reducing expenses, it is very desirable for repairing companies to choose this method of repairs whenever it is possible to do a good job by this means. This work is chargeable on the basis of actual time consumed.

Are there any requirements as to the minimum length of time for maintenance of original record of repairs made to foreign and private line cars? (257)

Yes. A period of one year is required under the provisions of Rule No. 7.

15 Roll Them Out Like New

Armature Soldering and Impregnating

A good solder job begins with stripping and preparation of the armature. Before soldering, drift the top leads down, Fig. 1, to close any gaps and fit them snugly into the riser slot. Go easy; heavy hammering may spring the commutator bars or close up the capillary space provided for the solder. Slight deforming of the top of the riser slot will keep the leads from lifting if the solder melts from overheating in service. Fig. 2 shows a suitable tool—a sort of double pointed cold chisel operated by air. The two edges register on the copper at adjacent sides of the slot and force it sidewise, locking the lead in the slot.

A large soldering pot is the most satisfactory method. V-bound commutators are usually loosened before soldering to avoid excessive strains from thermal expansion. Arch-bound commutators usually need not be loosened, but it is wise to check the manufacturer's recommendations. It the commutator is loosened, repress and tighten it after soldering.

The armature is preheated and placed in the pot, commutator end down. A sealing ring and asbestos packing are placed around the commutator to form a barrier for the solder. Have the solder temperature 375 to 425 deg C. The level should be raised rapidly, almost to the back of the commutator riser. A short metallic hoe is used to circulate the solder and dislodge particles which "freeze" to the "cold" commutator. Keep the commutator in the solder long enough to heat the risers to 290 or 300 deg C, indicated by the appearance of solder wetting the commutator surface. Drain the solder promptly from the basin, not raising and lowering the level repeatedly. Heat kills the flux on the first immersion, so, if you don't get a good job then, a second immersion is useless.

Two other soldering methods deserve mention. A high frequency induction coil is effective for heating the commutator locally, provided the coil is designed for the job and used according to instructions. A large soldering iron or a gas torch may be used for heating, but this consumes time. Don't use acetylene; the flame is so intense it may cause local overheating and anneating of commutator copper.

The original solder job on most traction armatures is pure tin. Lead-based solders are used on some. In resoldering, you have a choice: either use solder of the same kind as the original, or completely remove all traces of old solder. While pure tin melts at about 230 deg C and pure lead at about 300 deg C, a little tin mixed with lead is bad. Some such mixtures will "throw" at temperatures as low as 160 deg C.

Whatever the soldering method, note five important points:

- Capillary joints must provide room for the solder;
- Armature leads should be fluxed and flux applied to the commutator just before soldering;

(*Continued on page 46*)

Part 15, in series covering maintenance heavy of locomotive electrical equipment, written by J. K. Wentz, Locomotive and Car Equipment Department, General Electric Company, Erie, Pa.

Fig. 1—Leads should be drifted down in slots to give snug fit.

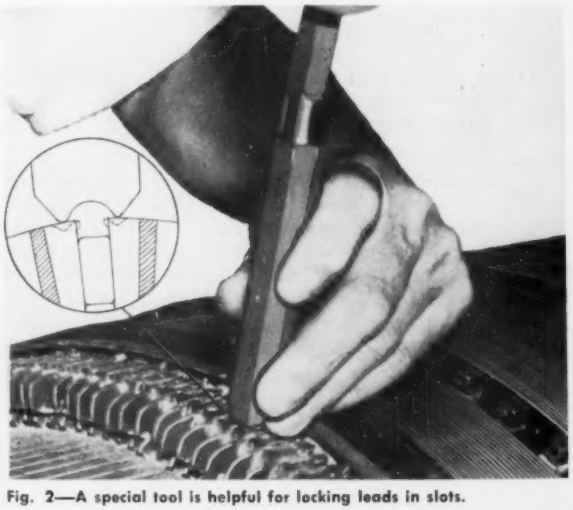


Fig. 2—A special tool is helpful for locking leads in slots.

Armature Soldering and Impregnating

(*Continued from page 44*)

- Parts must be at a temperature well above the melting point of the solder;
- Heat must penetrate to the bottom of the commutator slots (preheating is advised);
- Armature should be preheated to about 100 deg C, but don't keep it there longer than necessary or the flux may deteriorate.

Instead of soldering, connections between armature coils and commutator risers may be welded. With proper equipment, a good job can be done. The joint consists of fused copper, with no flux or solder, and penetrates only about 1/32 in. into the face of the riser. This makes rewinding easy. Welding has been used successfully for years in repairing armatures which have thrown solder and is now used increasingly on new traction motors. Cost of equipment is moderate, depending on the degree of automation desired.

Varnish Treatment

Before discussing varnishes and methods of impregnation, it may be well to ask why varnish treatment is used. The principal reasons are: to put a coat on the armature that will shed as much water as possible; to obtain a smooth, glossy surface that will shed dirt and oil. The varnish must also resist cleaning solvents and be hard enough to withstand blast-cleaning operations. Two lesser reasons, sometimes over-emphasized, are prevention of relative motion of parts, resulting in "buzzing" and wear, and improvement in heat transfer.

These last two reasons are of minor importance on traction equipment. Mechanical soundness of modern traction armatures does not depend on varnish. Core tightness is achieved by heavy end punchings and a commutator nut. Sound windings are achieved by solidly compacting the mica and glass into intimate contact with the copper and iron. These are features of new armatures and can be incorporated when rewinding old armatures. Armatures without these qualities can be improved by vacuum impregnation.

Resins do not materially help the heat transfer of this type of armature. One reason is that solidly packed, pretreated mica and glass have better thermal conductivity than loosely packed mica and glass which have been "resin solidified." Thermal conductivity of an insulation space that is practically all mica and glass is about four times better than a solid resin. Small air spaces have a thermal conductivity only one-eighth that of solid resin. In a well designed, tightly packed insulation system, heat escapes through the large areas of high conductivity and air spaces are not important.

Insert fillers, such as talc or metallic oxides, added to varnishes improve their thermal conductivity. However, there is not much improvement unless so much is added that the mixture becomes too thick to be used as a varnish. This filler also tends to filter out as the varnish passes through the pores of the insulation during impregnation.

What Is Best?

What varnish is best—asphalt, phenolic, alkyd, polyester, silicone or Alkanex? Each, in turn, was hailed as "best." None is a cure-all, but each has found its proper place in insulation systems, and its advantages and shortcomings are known. Epoxies comprise the latest entries in this field. Epoxies have certain very useful properties, but cannot perform miracles. To evaluate them, again look carefully at the question: *What is varnish treatment expected to do?*

So-called "moisture grounds" account for so much maintenance expense that everyone wants a waterproof armature. A treatment in paraffin would make an armature waterproof. But this would last only until the first time it got hot. Any treatment used should be effective for the life of the armature. This is a big problem today when railroads are looking for a million-mile motor and are also working their motors harder. Mere initial waterproofness is no measure of the insulation system's service life.

The big obstacle to getting waterproofing is differential thermal suspension. This occurs because the coefficient of expansion is greater for copper than for iron, and the copper —under certain conditions—is much better than the iron. Careful tests show that this expansion is greatest when a heavy current is applied to a cold motor. When about 70 per cent of rated current was applied to a cold motor, the copper moved endwise out of the armature core about 0.014 in. The insulation is about 0.040 in. thick, but only about 0.005 in. of this is resin. It simply cannot stretch enough to accommodate the axial movement between copper and core. The insulation is not strong enough to prevent

Fig. 3—Cracks in "resin-solidified" insulation resulted from differential thermal expansion.

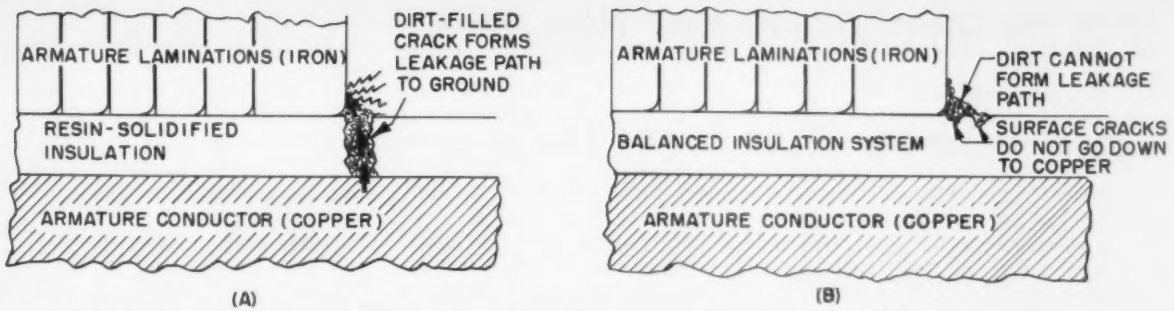


Fig. 4—Results of differential thermal expansion of resin-solidified armature insulation system (A) and balanced system (B) may vary.

this differential expansion, so it cracks.

Tests back in 1951 showed that armatures solidly filled with Permafill resin cracked. Recently, further tests with epoxies showed the same results. Though initially waterproof, cracks develop during load cycling, Fig. 3, and the armature is no longer waterproof. In this case, the coils were completely filled with epoxy resin before winding and the complete armature had two vacuum impregnations in the same high-grade epoxy.

Cracks in a "resin-solidified" insulation system tend to go nearly straight through to the copper, Fig. 4a. The armature may continue to run for some time in spite of these cracks, but it will not be waterproof. Should it get wet, it will dry out easily if it is clean. If dirt has collected in the cracks, a creepage path may be formed that can develop into a solid ground.

Even a well-designed, balanced insulation system will develop cracks. The cracks are small and superficial, Fig. 4b, and do not tend to go through to the copper. While this kind of insulation is not waterproof, it can be dried out or washed off. There are no "straight-through" cracks to collect dirt and develop grounds.

When a "resin-solidified" armature is rewound, stripping poses a real problem. If the hard, tightly adhering resin is burned off, temperatures must be kept reasonable. Core plate enamel and commutator mica binder deteriorate rapidly at 200 deg C. Commutator copper begins to anneal rapidly at 205 deg C. if it is tough pitch, and at about 300 deg C if it is silver bearing. Steel parts are unaffected up to 400 deg C.

Also, in considering what varnishes to use, remember the names are "family" names only. Members of any one family show wide variations, and new members appear almost every day. Some members of one family are practically identical to some of another family. Therefore, it is not safe to generalize. No one family will displace all others. Instead, the best members of each will find useful employment in balanced insulation systems.

Impregnation

Varnish is usually applied by vacuum-pressure impregnation, roll dipping, or hot dipping. Regardless of the method used, it is good to rotate the armature with the axis horizontal during baking. This tends to reduce drainage and give a more even coat.

In the vacuum-pressure method, the armature, usually at or near room temperature, is placed in a sealed tank. Most of the air is pumped out and the varnish applied under pressure. The term "vacuum" relates to atmospheric pressure as measured by a barometer. This is given in inches of mercury and varies from day to day as well as with altitude.

In a 29-in. vacuum, the pressure in the tank has been reduced to 29 in. (of mercury) below atmospheric pressure. For instance, if the barometer is reading 29.5 in., the absolute pressure in the tank is 0.5 in. Should the atmospheric pressure be 29.8 in., the vacuum would have to be 29.3 in. to have a 0.5 in. pressure in the tank. Pressure is also expressed in millimeters (25.4 = 1 in.) or microns (25,400 = 1 in.).

The vacuum allows the air in the insulation to expand and be drawn out by the pump. When the varnish is applied under pressure, the remaining air is squeezed into very tiny spaces so that varnish fills most of the voids. An absolute pressure of 0.5 in. is adequate and easy to obtain. At this pressure, the air in the armature expands to 60 times its original volume and about 98.3 per cent of it is drawn off by the pump.

In roll dipping or hot dipping, the armature is heated to between 100 and 150 deg C. Impregnation depends upon the fact that heat makes varnish very fluid, thus increasing its capillary action. Therefore, both temperature and viscosity should be closely controlled.

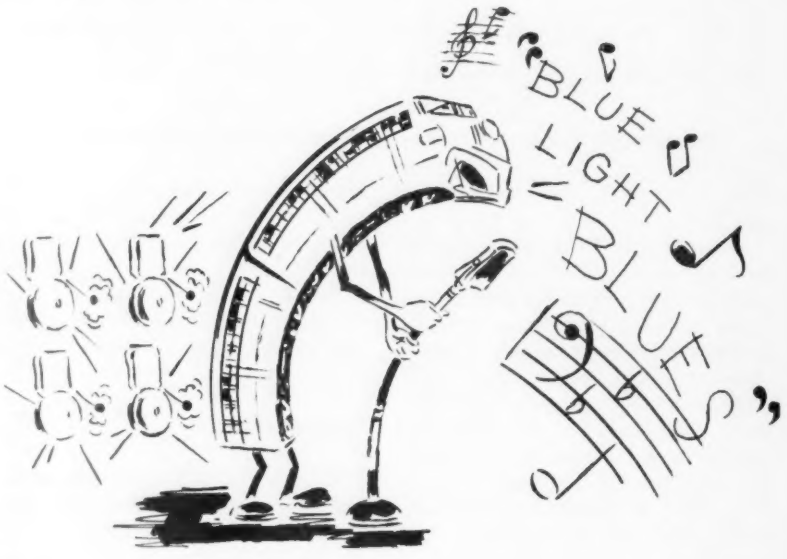
The vacuum-pressure method gives more complete impregnation and more effectively solidifies loose cores and coils. However, consider these factors: numerous voids exist because of inevitable drainage; prevention of drainage allows the armature to become "resin-solidified," which is not completely desirable; there is some question whether vacuum impregnation increases service life as compared to properly applied hot dip or hot roll dip.

Although the rest of the armature is waterproof, a moisture ground can still occur on the commutator string band. Use epoxy varnish to saturate the string and epoxy putty to form a smooth, waterproof insulation. Cotton string is best for traction armatures because it withstands flashovers better than glass, which becomes a conductor at low red heat.

New materials and methods appear constantly, but don't expect miracles. Like new drugs, these developments are wonderful when properly used, but none is a cure-all. Be cautious when considering any new material or process. Get all possible information about it, especially results others have obtained. If it looks good, try it out. If you don't have the necessary shop equipment, send a few armatures out for processing and evaluate them in service before finally deciding. Remember that there is no final answer. Progress hasn't ceased. The "good" today will be replaced by the "better" tomorrow, so keep your eyes open.

Diesel with the Blue Light Blues

By Gordon Taylor



This case shows how resourcefulness can prevent delays. Not long before sunrise one morning, a four-unit locomotive was handling a full tonnage ore train over a line which includes a 41-mile grade. There was a two-unit helper on the rear. Following a meet, the train was pulling out of a siding near the foot of the grade. The engineman had just placed the throttle in No. 8 on the lead unit when suddenly he got the impression the headlight was unusually bright. Almost immediately the alarm bells sounded throughout the four-unit locomotive. At the same time, the engine on the front unit went to idle. Engineman Roy Runner applied the brakes and brought the train to a stop. Inspection showed a blue indicator light burning on the lead unit; the three trailing units were all right.

The blue light tells that there has been an alternator failure on the unit. Should alternator voltage fall below a predetermined figure, the NVR (no a.c. voltage) relay will drop open. This relay has three sets of contacts. One set, when open, interrupts the circuit to the "ER" relay. With "ER" relay de-energized, the A, B and C solenoids in the engine governor will be de-energized and the engine speed drops to idle.

The second set of contacts will close, lighting the blue "alternator failure" light. The third set of contacts will close to energize the SG wire and ring alarm bells in all parts of the locomotive.

Roy Runner now found himself on a unit with an alternator failure and an engine running at idle speed. His experience told him to check fuses in the auxiliary generator circuit and the alternator field fuse. His hunch proved correct when he found the 150-amp fuse blown in the output circuit of the auxiliary generator. This fuse not only provides a circuit for battery charging, but it feeds the alternator field circuit. Without this fuse, the alternator cannot be excited and, of course, will fail.

Replacing the fuse, Runner released the brakes and began to get his train under way once more. The unit loaded up perfectly, and Runner thought his troubles were over. Again, the headlight began to get unusually bright. In a few moments, the 150-amp fuse blew again. This time it developed there were no spare 150-amp fuses in any of the four units. The maintainers had failed to stock the control cabinets with full sets of spare fuses.

The train was now approaching the grade that required all six units. Without the aid of the lame unit, the train would have to stop, call for help, and suffer a two- or three-hour delay. Runner was in a quandary. He was certain that the trouble was due to a jammed voltage regulator which permitted the auxiliary generator voltage to rise too high, causing excessive current to flow through the 150-amp fuse. Without proper fuses to test this theory, he could not be sure.

The only heavy-duty spare fuse to be found was a 100-amp type. He reasoned that, if it were used to charge the battery, it would blow even quicker than the 150-amp fuse. But if he could use it to restore the alternator field circuit, he could restore the alternator and get the engine back on the line at regular speeds. If he could accomplish that, the unit would help haul the train if the battery would handle the fuel-pump circuit and the battery field circuit of the main generator while the train moved over the grade. Fortunately, the sun was now up and the headlight was no longer needed. The second unit was another A unit F-7 like the lead unit. By pushing in the control button on that unit and leaving the control button in on the leading unit, the 74-volt d.c. power for locomotive control could come from the second unit.

To use the fuse, Runner bent the 150-amp fuse-holder clips so they would grip the 100-amp fuse. Then he placed the 100-amp fuse in the fuse clips. Next, with the cover of a paper match book, he blocked the reverse current relay in open position and put the engine on the line. The unit went right to work. Of course, the battery-charging ammeter showed discharge because the blocked reverse current relay would not permit charging current to flow to the battery.

To conserve every bit of battery current possible, all light switches on the front unit were opened. It took over two hours to top the grade.

At this point, blocking was removed from "RC" relay as the unit went into dynamic braking. The diesel engine and auxiliary generator now would be operating at reduced speed, favorable for controlling the output of the auxiliary generator into the battery-charging circuit. The battery-charging ammeter showed 97 amp and charging continued at that rate while train was going down grade.

It must be remembered that in dynamic braking the diesel engine speed is restricted. The braking control circuit, with brake limiting regulator, is usually arranged to speed the engine to Run 3 to cool the traction motors while braking current is held to 700 amp. It takes Run 3 diesel-engine speed to turn the alternator fast enough to provide the voltage needed by the traction-motor blowers. Some of the older units do not have dynamic brake limiting regulators. In that case, the brake current limit is 600 amp and the engineman must control to this limit by use of Braking Control Lever or Transition Lever. On such units, the diesel engine operates at "idle" speed while dynamic braking is in operation.

When it came time to go off dynamic braking, Roy Runner again blocked the reverse current relay and the last 73 miles were made into the home terminal without battery charging.

When the train reached the home terminal, the engineman made a report of his trouble to the maintenance crew. One of the maintainers asked: "Roy, what would you have looked for if the 150-amp fuse had not been blown?"

"Well," replied Roy, "I could have checked several other things. Whenever an engine stops while 'on the line,' the blue light will come on, because stopping the engine also stops the alternator. In that case, start the engine (check the overspeed trip and fuel flow) and attempt to put the engine on the line. If the light comes on instantly, then start checking the auxiliary generator fuses and the alternator field fuse.

"Because this engine was still running at idle speed after the alarm bells sounded, it was an indication that there was an open circuit in the auxiliary generator or in the alternator field. The most likely open circuits would be blown fuses, such as the 30-amp auxiliary generator field fuse, the 35-amp fuse in alternator field, and the 150-amp fuse that is the main output fuse for the auxiliary generator.

"Fortunately, the blown 150-amp fuse was easy to find. Unfortunately, I could find no spare fuses of the right size to replace it. I am thankful that the battery had enough charge to help us over the grade during the time it was not being charged. The success of this venture depended on a good battery. With a weak battery, we would have been left singing the 'Blue Light Blues' to an accompaniment of jangling alarm bells."

Just a word of caution. Blocking relays and contactors is not an easy way to correct diesel troubles. It will get you into more trouble unless you *know* what the result of the blocking will be. Roy Runner knew what he was doing. If you really know your diesel and all of its functions, the blocking of certain relays or contactors under *certain conditions* may help you as it did Roy Runner.

The moral of this story is: "Know thy diesel."

Personal Mention

Canadian National.—*Moncton, N.B.:* K. W. THOMSON appointed superintendent of shops. Formerly inspector, mechanical department, Toronto, Ont.

Kansas, Oklahoma & Gulf-Midland Valley-Oklahoma City-ADA-ATOKA. — *Muskogee, Okla.:* A. J. DANIEL appointed mechanical superintendent.

Lackawanna. — *Scranton, Pa.:* ARTHUR HUGHES appointed assistant superintendent car department.

New York Central.—*New York:* MARSHALL I. YASUNA appointed mechanical and electrical engineer, system, succeeding HARRY W. WALSH, retired. WILLIAM C. WARDWELL, JR., appointed district locomotive inspector. Mr. Wardwell formerly terminal foreman, North Bergen, N. J.

New Haven.—*New Haven, Conn.:* R. W. HOOPER appointed assistant mechanical superintendent-locomotive maintenance. W. E. SYMONS appointed mechanical engineer.

Northern Pacific. — *St. Paul, Minn.:* E. L. MUSOLF appointed electrical engineer, succeeding R. C. SORENSON, retired. T. J. OLSON, assistant to electrical engineer, appointed assistant electrical engineer, succeeding Mr. Musolf.

OBITUARY

Fred E. Andrick, 52 general car foreman, Santa Fe, Amarillo, Tex., died Feb. 13 at Lubbock, Tex.

C. C. Coult, who retired in January as mechanical engineer for the Lackawanna at Scranton, Pa., died Feb. 16.

Supply Trade Notes

HYDRA-CUSHION INCORPORATED.—Hydra-Cushion Incorporated, with headquarters at 420 Lexington ave., New York, has been formed by *Evans Products Co.*, Plymouth, Mich., and *Waugh Equipment Co.* of New York, to manufacture and market the Hydra-Cushion under-frame. Chairman of the board of the company, is *Ben Colman*, vice-president in charge of Evans Railroad Loading Division. *H. C. Hallberg*, president of Waugh, is president.

■

NATIONAL MALLEABLE & STEEL CASTINGS CO.—*Stowell C. Wasson*, staff vice-president and director, retired

■

INTERNATIONAL PROCESS EQUIPMENT CO.—International Process, Dayton, Ohio, has acquired from *Magnus Metal Division of National Lead Co.* all necessary pattern equipment and jigs and fixtures for the manufacture of oil dividers, mechanical lubricators, injectors, and other steam locomotive specialties.

(Turn to page 54)

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WIX POROSITE Diesel Lubricating Oil Filters have proved themselves where proof is conclusive . . . on the job. The principle of filtering Diesel lubricating oil through paper faced many who said it couldn't be done. *But* WIX *did it!* WIX, who has pioneered so many advances in Diesel Oil Filtration, now offers a development that SAVES A BIGGER DOLLAR WITH A BETTER PRODUCT. Yes, WIX answers high maintenance costs with Filters that Save Oil, Save Time and Save Money.

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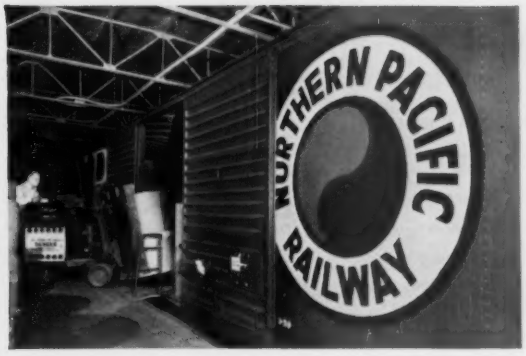

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"When a car equipped with N-S-F comes into one of our plants, I don't have to worry about the condition of the floor—I know it's Class A."

So says F. E. Hufford, General Traffic Manager for Minnesota and Ontario Paper Company. A satisfied shipper, thanks to Northern Pacific service, he knows that NAILABLE STEEL FLOORING, welded to the underframe of a freight car, actually adds strength at critical points and takes another big load off the shipper's mind.

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The three Stran-Steel products to remember are N-S-F for flooring, Anchor Lining for sidewalls and endwalls, and Stran-Steel Grain Door Nailers, that take repeated nailing of grain doors without weakening. Full information and cost studies are available from Stran-Steel representatives in Chicago, New York, Philadelphia, St. Louis, San Francisco, Minneapolis and Atlanta. In Canada, N-S-F is made and sold by International Equipment Co., Ltd., Montreal. Stran-Steel Corporation, Detroit 29, Michigan.

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Supply Trade Notes

(*Continued from page 50*)


J. D. Dickinson


J. A. Burt

KRAUSS-MAFFEI, A. G.—*John D. Dickinson,* who has been handling equipment sales for Krauss-Maffei, has been appointed United States and Canadian representative for the company. Office: 21 Reynal Road, White Plains, N. Y.

■

ALUMINUM CO. OF AMERICA.—*James A. Burt* appointed manager of railroad sales.

■

NORTH AMERICAN CAR CORP.—*Harold M. Nelson,* chief mechanical officer, elected also vice-president.

■

AMERICAN RAILWAY CAR INSTITUTE.—*John W. Scallan* elected president and *Herman Altschul* and *H. H. Rogge,* vice-presidents. Mr. Scallan is president of Pullman-Standard, a division of Pullman Incorporated. Mr. Altschul is vice-president - sales, General American Transportation Co. Mr. Rogge is president of American Car & Foundry Division of ACF Industries.

■

DEARBORN CHEMICAL CO.—*T. J. Weisbruch* appointed district manager of new Indiana-Michigan district office at 3001 Fairfield ave., Fort Wayne, Ind.

■

GOULD-NATIONAL BATTERIES, INC., NICAD Div.— *A. H. Lindsay* appointed manager of railroad sales.

■

DUFF-NORTON CO.—*T. W. Krueger,* general sales manager, named vice-president and general sales manager.

■

McCONWAY & TORLEY CORP.—*Richard E. Bowe,* secretary and treasurer, elected president and treasurer, succeeding retired *President Grover L. Michael.*

■

YOUNGSTOWN SHEET & TUBE CO.—*John P. DeHetre,* assistant sales manager, appointed general manager of sales, succeeding *John M. Tuthill,* retired. *George D. Wick, III,* resident salesman, Atlanta district, Charlotte, N. C., appointed assistant manager of standard pipe sales at Youngstown, Ohio.

■

BINKS MANUFACTURING CO.—*James Treece* appointed manager of Railway Sales Division, succeeding *George Green,* retired.

OBITUARY

JOHN B. STEVENS, service engineeer, Journal Box Servicing Corp., attached to the Baltimore & Ohio, died March 1.

■

ALBERT P. WITHALL, 80, president and chairman of the board of W. H. Miner, Inc., and Enterprise Railway Equipment Co., died March 6 at his home in Chicago.

Letters

Wiring Diagrams

TO THE EDITOR:

My compliments to Ken Wright and his efficient helpers in solving cooling equipment troubles on mechanical reefers as chronicled in your interesting magazine.

Since many of the problems appear to be related to the electrical components of the equipment, as has been the case over the years on diesel-electric locomotives, the necessity for an adequate wiring diagram is apparent.

Committee 18 of the Electrical Section of the AAR has developed specifications for wiring diagrams and symbols for rolling stock to simplify this problem as has been publicized over the years by your magazine. Most railroad shop personnel are familiar with these standards, since they are used by locomotive and car builders.

The diagram published on page 32 of the February issue of your magazine, while quite readable by a good electrician, is drawn according to NEMA standards and does not use those symbols and procedures most familiar to railroad electricians and mechanics.

Would it not be well to use railroad standards to show railroad electrical functions?

C. W. Martin,
Assistant engineer—diesel-electric, Baltimore & Ohio

Coupling Devices

TO THE EDITOR:

In the editorial in your February issue of Railway Locomotives and Cars [Automatic Enough? p 13] mention was made about consideration of better methods of coupling cars. . . . The Willison automatic coupler [a product of the National Malleable & Steel Castings Company] is being used in a few limited applications in the United States and is in more common use overseas. It has the unfortunate disadvantage of not being interchangeable with the E or F type couplers. However, it has the distinct advantage of always being prepared for coupling, or as the coupler people term it, "It is always in set lock position when it is not coupled." Thus it does not have to be prepared for coupling and has a greater degree of gathering scope than the E or F couplers used in this country. The Willison coupler does not make any provision for coupling of air hoses. I thought that the Willison coupler has some very interesting features and thought it would be of interest to you also.

Max Ephraim, Jr.,
Assistant chief engineer, Electro-Motive Division, General Motors Corporation.

What's New

(*Continued from page 15*)

Corrugated Carton For Resistors

A corrugated container for resistors for diesel-electric locomotives is said to permit shipment savings of 25 lb and an average saving of 25 per cent per 100-lb unit in freight charges. Resistors can be taken from the box with just a knife. No hammers or crowbars are needed, and no excelsior has to be blown from the resistors. *Repair & Renewal Parts Section, Locomotive & Car Equipment Dept., General Electri Co., Dept. RLC, Erie, Pa.*

Double-Seal Gasket Tape

A double-seal asbestos gasket tape for use around bolts or studs is available in three types. Style 746 is a plain wire inserted folded tape with a lattice width, or bolt space, from ⅛ in. to ⅞ in.; overall widths from ½ to 3 in., and thicknesses from ⅛ in. to ¼ in. Style 738, a plain wire inserted tape woven flat, is available in thicknesses from 1/32 in. through 3/16 in., also up to 8 in. wide in 1/16 in. thickness. Style 748 is non-metallic. Thicknesses and widths are the same as for Style 738. *Union Asbestos & Rubber Co., Fibrous Products Div., Dept. RLC, 1111 West Perry st., Bloomington, Ill.*

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Reports on Nalco Flange Lubricators Show 50 to 400% Gains in Locomotive Wheel Life

Typical Results Reported with Nalco "Moly-Stick" Dry Flange Lubricant In Railroad Service

Nalco's simple, low-cost "Moly-Stick" Dry Flange Lubricator continues to help operating men cut time, labor and equipment expense for the world's railroads. Developed to cut locomotive wheel flange wear, Nalco Flange Lubricators are showing economies in other aspects of wheel and rail wear problems. For instance:

Ore Car Wheels Wear 50% Less

Recent comparative tests on new ore cars showed greatest wear on left #4 wheels. A Nalco-Lubricator-equipped car showed from 50% to 67% less wear on left #4 wheel than any of the three unequipped cars in the tests.

Reduced Rail Wear

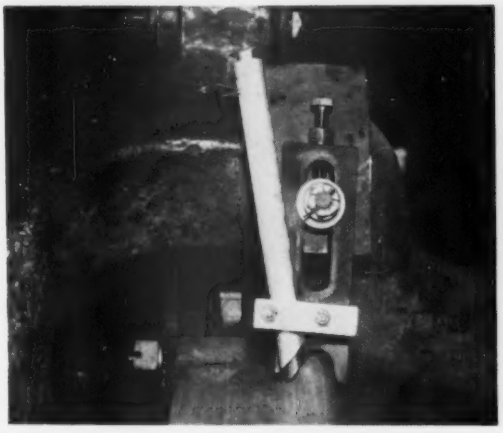
Locomotive installation of Nalco Flange Lubricators showed no flange wear after 70 days' operation—plus the bonus of definite indication of reduced rail wear on curves.

"Annual-to-Annual" Flange Life

This report says: "In most cases locomotives equipped with Nalco Lubricators are going from annual to annual without having to turn wheels for flanges. This was not possible prior to installation of Nalco Lubricators . . . few remaining 'wet' lubricators are being removed as locomotives receive annual inspection, and are replaced with Nalco Lubricators."

New "Moly-Sticks" Average 4000-6000 Miles

Reports indicate that new catalytically cured "Moly-Sticks" have high impact strength and excellent resiliency . . . are giving 4000 to 6000 miles of service. In switching service this long wear life means replacement is normally needed only at monthly inspections.



Nalco Flange Lubricator puts the lubricant exactly where it's needed . . . nowhere else! Stick replacement is extremely simple: Guide shoe retracts, swings out for insertion of "Moly-Sticks", then swings back into position. No nuts or bolts to loosen . . . no tools needed for this quick and easy operation.

Flange Life Upped 400%

"Locomotive has made 9435 miles since Nalco Lubricators were installed. Normal flange life is 7000 to 8000 miles. At the present rate of wear (with Nalco Lubricators) we are going to show better than a 400% improvement."

Installing Nalco Lubricators

Complete Nalco Flange Lubricator protection can usually be installed on a diesel locomotive (8 lubricators) in one man-day or less. Inspection of units and replacement of "Moly-Sticks" is a quick and easy operation.

For complete information about this more effective, more trouble-free method of flange lubrication, call your Nalco Representative today, or write Nalco for Bulletins 571 and 591.

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Safer, detergent-fortified solvent cleaning . . . plus optimum evaporation rate, too. That's Turco-Solv, the safety solvent that offers a perfect balance of safety, cleaning power and evaporation rate.

An exclusive built-in detergent action energizes Turco-Solv . . . insures quick and complete removal of stubborn soils from generators, switch panels and other electrical equipment.

Turco-Solv is safe for personnel . . . safe for equipment. And, there's **no danger** of fire or explosion . . . even in the critical final ten percent of evaporation.

Turco-Solv is but one of more than a hundred cleaning compounds, developed by Turco research, specifically for railroad cleaning.

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